CHEMICAL INDUSTRIES

The Chemical Business Magazine

Do We Want War?

IT is widely held that the American chemical industry was born during the World War; that it profits exorbitantly from a war; that, therefore, it would not be adverse to a war. From two false premises an erroneous conclusion is reached. Even the implication that chemical manufacturers profit abnormally during a war is but a half truth; less true of the chemical maker than of the steel or textile manufacturer or of the wheat and cotton farmer.

Our chemical industry was no war baby. Our first chemical plant was established in 1635, and in 1914 the value of our chemical products was over two and a half billions, greater than the combined chemical outputs of Germany, England and France, more value than was produced either by our own steel or motor industries. True, we then imported our coal-tar chemicals, and the World War created sensational shortages of dyes and medicines. Our dramatic triumphs in these fields fired the public imagination so that older, more basic, vastly greater chemical operations were by many forgotten.

True also, that in modern warfare chemicals, like motors and airplanes, are essential munitions; but the demand for metals, uniforms and blankets, shoes and food, have also all been enormously increased. It is a bitter truth that war creates abnormal demands for purposes of destruction, a wickedly perverted stimulation of all economic activity; and modern war has become savagely omnipotent in this respect. But this unnatural stimulus has disastrous effects.

We cannot forget the scores of half-built plants, the tons of material in process that the Government ruthlessly cancelled in 1919, nor the panicky decline of chemical values during 1920. From 1919 to 1921 our chemical output slid from $6,090,949,000 to $4,594,777,000, and 3511 chemical firms went out of business. We learned the bitter lesson that a chemical war-boom turns out to be a boomerang.

The past ten years have not been easy ones, but our growth has been steady and sound. In the teeth of the depression the increased output of some of our basic staples is impressive: caustic from 761,792 tons in 1929 to 961,591 in 1937; ash from 2,682,216 to 3,037,421 tons; chlorine from 199,472 to 446,261 tons; bichromates from 39,301 to 51,056 tons. What these figures might have been in a more prosperous period is anyone's guess; but it must be clear to anyone that the chemical industry wants not war, but peace.

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Government Competition Congress, suddenly imbued with revived independence and at last thoroughly resentful of the domination of the executive branch, is of a mind not to further additional expansion of governmental activity designed directly to compete with private enterprise. Witness: the little mentioned but highly important rider to the last PWA appropriation measure which provided that none of these funds should be expended for the construction of enterprises competing directly with industry.

Accordingly, the Pierce Bill, authorizing a chlorate of soda plant in Oregon to be operated with power from the Bonneville dam and providing for free distribution to farmers for weed eradication, seems destined for committee limbo.

It is too bad that the Supreme Court, because of the very nature of the T.V.A. suits, has not dealt with the fundamental question of competition with private business. Yet, until this question is clearly defined and passed on by the Supreme Court, there must be confusion, mistrust and hesitancy in the minds of business leaders. Government operation of any enterprise virtually means monopoly in that particular field.

The National Association of Manufacturers has just offered a new seven-point plan to aid business recovery based on an 18-month study by a group of more than 50 leading industrialists and economists. It is highly significant that the N.A.M. committee, headed by W. T. Holliday, president of the Standard of Ohio and with E. V. O'Daniel, Cyanamid vice-president, as vice-chairman, listed as number one in its major points "Absence of governmental activity which prevents the effective functioning of private enterprise."

North African Phosphates Production of North African phosphates last year reached 4,500,000 tons, roughly one-third of the world's output. About 85 per cent. of the exports of phosphate made from North Africa goes to European destinations, and no less than 80 per cent. of the total quantity of phosphate imported by European countries comes from North African sources.

Clearly the United States has permanently lost the European market, except, possibly during another world-wide war. Sales through the North African Sales Cartel in 1937 reached 4,036,895 tons, while the United States total, both domestic and export, amounted to but 3,954,238 tons.

These figures, together with those in Poole Maynard's enlightening article "New Data on Our Phosphate Reserves," CHEMICAL INDUSTRIES, January, 1939, page 26, should destroy Mr. Roosevelt's fear of early depletion of our Eastern reserves as stated in his phosphate message to Congress last year, and prove there are no factual reasons, aside from ones that are purely of political expediency, for federal government intervention in any major development of our Western reserves.

The Italian demands in regard to French North Africa have focussed attention upon the importance of that area in the phosphate picture. The totalitarian states are in a highly uncomfortable position in this raw material. Italy takes astonishingly large quantities, some 730,000 tons last year, despite her stringent currency position. Germany, in a similar currency-starved state, is in fourth position in imports of North African phosphate, taking about 448,000 tons in 1937 in addition to 370,000 tons from the United States.

Technically Trained Salesmen Just how desirable, just how necessary is a sound chemical training to a salesman in the chemical field? Theoretically it is extremely desirable. Mr. Ernest Bridgwater, manager of the rubber chemicals division of the R. & H. Chemicals Department of du Pont, speaking recently before the New York Chapter of the American Institute of Chemists, very ably presented what would seem to be the essence of the matter and that is, that assuming two salesmen possess to an equal degree the admirable and very necessary qualifications of personality and natural ability, the one fortified still further with a chemical training will do a better job than the one lacking such knowledge.

But when we speak of technically trained salesmen is there complete agreement and a definite understanding of exactly what the term defines? Does it mean a man with two, or with three years of chemistry courses, or does it mean a B.S. or a Ch.E. graduate, or does it really exclude all these and only include the man with at least a master's degree and more desirably a doctorate? The expression at best is a loose one and open to several interpretations.

If industry is convinced that it wants technically trained salesmen, then it had better agree on just what kind and just how much training it ideally wants in its future salesmen. If a definite pattern is presented to the universities and colleges they can cooperate, but they must know what they are expected to turn out.

What Is The Chemical Industry?

Answered by Williams Haynes

IS rayon a chemical product? Or a textile fibre? That it is at once both chemical and fibre is a perfectly correct answer, but a quite unsatisfactory one; that is, if you are interested in determining the value of the products either of the textile or the chemical industries.

Certainly rayon cannot be grouped with the other great textile fibres—wool, silk, flax, and cotton—as a product of agriculture. It is obviously one of those comparatively new, chemically-produced, industrial raw materials which are revolutionizing many manufacturing fields.

In the coatings industries, for example, paint, which is essentially various finely ground pigments suspended in drying oils, and varnish, made from hard gums in a suitable volatile solvent, are both essentially sundry natural materials combined by physical operations. But a lacquer, of either the cellulose or resin type, is made by chemical reactions between synthetic materials.

And what about Neoprene, or Thiokol, or Buna, or Plioform, or anyone of half a dozen less known rubber-like materials? How are they to be classified?

Plainly, among the minor revolutions wrought by chemicals in our economic structure is to be a complete rewriting of a lot of old industrial definitions and a thorough-going revision of our statistical classifications.

So what? is not the answer, for it is important to the chemical industry to be properly classified.

It does make a very great difference in judging the size and growth and comparative position of the American chemical industry if, going back to our first example, rayon is to be counted as a chemical or a textile product, or put into a new classification of its own. If the taxes paid by tobacco and gasoline are included as "chemical industry" (as was recently done), the figure is so palpably padded as to appear ridiculous. Viewed objectively, sodium nitrate from Chile and from Hopewell is not at all the same material, and this distinction is serious in chemical, or commercial, or political considerations.

Chemical industry has become a "public industry" that is today looming large in the "public eye." Not only are the shares of our leading chemical companies widely distributed and freely traded in; but also they are recognized as a distinct industrial group which many feel holds exceptional future opportunities for profitable investment. Thus the "statistical position" of chemicals becomes something much more important than the glib phrase of a trade paper market report.

Furthermore, these new synthetic materials of ours have uncomfortably disturbed the established order in many an established industry. Not infrequently they have invaded big markets long supplied by natural products from farm and mine. Accordingly, while these chemical triumphs have fired the public fancy, they have heated a glowing resentment in many industrial quarters.

Finally, both the political and the economic situations, at home and abroad, are shoving the chemical industries and their products into the center of the world stage. Our public relations, about which we hear so much these days, are becoming exceedingly complex and more and more delicate; and certainly if we expect the people and the politicians, the financiers and the farmers, our competitors and our customers, to understand us, to comprehend our problems, to be sympathetic to our aims, we must at the outset make quite clear to them what the chemical industry consists of and what a chemical product is.

The chemical industry itself has not yet agreed on these simple, basic definitions. Is it not high time that we did so?

A wise and witty chemist has already written such a definition: "The chemical industry produces commodities which differ chemically from the raw materials out of which they are made." And Dr. Teeple added, lest the chef and the plasterer should set themselves up to be chemical producers, that "these chemical changes in materials must be wrought by chemical means and under chemical control."

Dr. Teeple's definition emphasizes the distinction between such purely physical operations as grinding and mixing pigments in linseed oil and turpentine to make paint and the essentially chemical characteristics of lacquer production. It also makes easy the identification of the real chemical industry. Sulfuric acid from brimstone, alcohol either from molasses or ethylene, caustic from salt, acid phosphate from phosphate rock—these are plainly chemical operations.

Thus all the so-called heavy chemicals, the fine chemicals, the photographic and aromatic chemicals, the dyes, the solvents and synthetics, are obviously true products of the chemical industry. But gunpowder and Bordeaux mixture; baking powder and straw hat cleaner; aspirin tablets and Eau de Cologne, although not commonly considered products of chemical industry, are nevertheless indubitably straight chemical products. Accordingly, the chemical field itself is clearly divided into two parts:

1—The Chemical Producing Industry which manufactures all sorts of chemical products from ammonia liquor to plastic molding powder.

2—The Chemical Converting Industry which makes chemical products into all sorts of consumer goods from fertilizers to cigarette holders.

Beyond these two classes of the chemical industry proper is a great group of important chemical consumers:

3—The Chemical Processing Industries which treat natural materials with chemicals in order to adapt them better to human use.

Rubber vulcanization, tanning leather, the transformation of fibre into cloth, of iron into steel, are all operations involving much chemistry and employing many chemicals. But they are not, strictly speaking, chemical operations.

The distinctions between these three industrial groups are clear cut and logical. The first makes chemicals. The second converts chemicals into consumer goods. The third uses chemicals to process other materials. In the first group chemicals are the end products; in the second, they are raw materials; in the third, they are tools. These distinctions make real differences.

If, for example, you are selling chemicals and want to estimate the domestic market for iron-free caustic or dibutyl phthalate; or to judge how rapidly the Japanese chemical industry is expanding; or to measure our chemical imports from Germany, it becomes a matter of very real concern whether the official statistics include rayon and lacquer as chemicals (as the Japanese and German figures do), or whether (as is done by our Department of Commerce) these fast-growing materials are reckoned outside the chemical products. If, on the other hand, you are selling to the chemical industry—be it filter presses or filter paper, I. C. C. drums or lithographed cans—you must mark well these distinct types of chemical operations and separate the companies which employ each. Each group is a different market.

Such a blanket classification as the "chemical process industries" simply smothers comparison. It makes bedfellows of coke ovens and perfumery factories, soap plants and dairies; industries so widely separated in their economic position, in capital structure, in manufacturing operations, in sales channels, that consideration of them as a group is like the classical comparison of cheese with chalk. If, however, the three divisions are recognized, each is found to possess certain salient, common characteristics.

The chemical producing industries are, of course, our chemical industry proper; small numerically, but generally composed of large units. They produce some 4000 distinct chemical items, among which we should today include the synthetic materials, rayon, resins, plastics, rubber substitutes. Most of these companies produce many different chemical products and almost every chemical has many uses and so many markets. These chemicals are industrial raw materials. Over 90 per cent. of their output is consumed right within the chemical industry itself or in the chemical converting field. They are produced in vast tonnages in distinctively chemical apparatus and shipped in bulk containers. This entire group is characterized in its production operations by varying yields and fluctuating costs; by competition from both new products and new processes; by high obsolescence and excessive plant depreciation. Hence, within this field research is a necessity and progress is exceedingly accelerated.

Within the second group are the makers of fertilizers and insecticides, explosives, coatings, soap and glass, medicines and cosmetics—all products that are essentially chemicals converted into goods for our daily use. Within this group, too, fall the molders and laminators of synthetic plastics and the dry cleaners' laundries. Here too, is the growing group of chemical specialty manufacturers, who may in turn be divided into the makers of household, industrial, and agricultural specialties. For the public they produce polishes for metals, floors, shoes, automobiles; cleaners for drains, rugs, wallpaper, straw hats, clothing; water softeners, insecticides, and moth repellents; radiator cleansers, anti-freeze mixtures, top dressings for automobiles. For the industries they make wetting-out agents, emulsifiers, driers and solvents, accelerators and inhibitors, abrasives and polishes, bates for tanning, special oils to soften leather, make fibres spinnable, to pull wires, to prevent rust; thousands of chemical compounds that make goods better and more usable and less expensive for us all. Farmers, orchardists, and gardeners all now have their own chemical specialties in fertilizers, insecticides, fungicides, even in botanical hormones and nutrient solutions for the soilless growth of plants.

This chemical converting group is a heterogeneous lot, large and small, with many sub-divisions and little in common save that they are selling chemical products to the public. Outside the chemical industry proper they are the largest consumers of chemicals which they mix, manipulate, and compound; pack into bottles, tins, collapsible tubes, canvas and paper bags, and what not.

The third group, the chemical processing industries, are chemical only incidentally. They treat their raw materials by some form of chemical processing; but both in their purchase of chemical supplies and their use of chemical apparatus, this is but one step in their production operation. A woolen mill scours, softens, bleaches, and dyes for which it buys a wide variety of chemicals and chemical specialties that it uses in simple vats and tanks. Its chief raw material is raw wool. Its great capital investment is in spinning and weaving machines. Its finished product is woolen cloth.

Rubber, paper, leather, textiles, steel, and the nonferrous metals are the great chemical processing industries. All have basic similarity to the woolen mill in that their plant equipment is not principally the chemical type of apparatus and that in each the principal raw material is some natural product, latex, wood-pulp, hides, cotton, or ores.

Mercury Down the Ages

Part 2

By Charles S. Wehrly

THERE are over twenty mercury ores but Cinnabar (the pure ore testing 86.2% mercury), a dull red crystal occurring as specks, streaks or veins (often pinched), is the only ore of commercial value. It is essentially free from other metallic compounds. The miner usually recognizes the red color which, at times, however, is so slight as to be almost unnoticeable except by streaking a piece of the ore. Panning is a very accurate method of determining a rough assay. Mining is done by the quarry or open cut method, stripping of the overhang and the usual shaft and tunnel. Outcrops are sometimes visible, but owing to the relatively soft character of the ore, erosion may take place.

Outside of the individual difficulties inherent in all mining ventures, the metallurgy of the ore is a relatively simple one, consisting of roasting or heating to a temperature of from 500° C. to 700° C. when the mercury is driven off and then condensed. Three types of heating units are used, the retort—originally made of clay and first used as early as 1530—, the shaft furnace, and a rotary kiln. The cheapest type is the retort which, however, is not adaptable to large operations and which today is largely used as an adjunct to or as a test plant at large mines. Direct heat furnished by any sort of fuel is used. In retorting, the ore is often mixed with lime. The shaft furnace was first used at the Huancavela Mine in Peru in 1633. It was introduced by Bustamente to Spain in 1646 and there used at the Almaden Mines until recently. A development of this furnace was made by Scott in this country in 1875, a factor which rescued the mercury industry in this country since high grade lump ore deposits had diminished. Scott's furnace which consists of one or more vertical shafts in which are set alternate tiles at the angle of 45 degrees permits the treatment of low grade "fines". This furnace is still used today at several mines in this country. It can be continuously operated and has the advantage of no moving parts and of being adaptable to the size of the mine. The cost of a Scott furnace will range upwards of $400.00 per ton day.

Further depletion of rich ores led to the application of the rotary kiln by means of which large quantities of low grade ores can be economically treated. Although suggested as far back as 1876 the first successful commercial rotary furnace was not operated until 1918. Today this method predominates. Kilns range in size from as low as 12 tons to 100 tons capacity costing upwards of $500.00 per ton day. Rotary furnaces are oil fired, use ore from one inch to two inches in size and operate at one R. P. M. Suitable draft must be provided and dust collectors are part of standard apparatus. The cost of operating a Scott furnace is about 75c per ton, that of a rotary kiln from an estimated low of 75c to $2.50 per ton. It is generally considered that the cost of mining varies from two to three times the cost of reduction.

The condensation of the volatilized mercury is effected by leading the furnace gas through iron pipes coated with an acid-proof paint, wrought iron pipes, even glass pipes, but mostly through common clay tile which is the cheapest and best. Water scrubbers are frequently added to the condensation train. The efficiency of the treatment of cinnabar ore is largely a matter of the efficiency of the condensation system. Claims are made that the furnaces and kilns yield 95%, but in actual practice a total output of 85% to 90% is considered good. Hand picking or sorting ores is done at some mines, but the advantage gained is a matter of the particular ore body and not generally carried out. No satisfactory attempt at flotation of mercury ores has been accomplished. The relative low tenor of cinnabar ores—8% in Spain, ½% to 2% in Italy, 1% in Mexico and less than ½% in the United States precludes transportation to a custom smelter, hence the mine must be a complete unit. The only exception is a recent experiment in which hand picked Mexican ore was sent to this country for reduction.

The quality of the mercury so produced is exceptionally pure. Random assays show well over 99.5% and as high as 99.9% with dirt and oil from the insides of the flask as the only mechanical impurities. It is peculiar that no standard has been set by the industry—a fact probably caused by this unusual degree of purity. The U. S. P. states that mercury should test at least 99.5%. One large user, who if he actually received such impure metal would reject it, calls for 95%. Conversely another company has set up specifications which cannot be met with commercial metal. Further purification is not necessary in the majority of cases and mechanical cleaning will suffice. Commercial mercury is termed "prime virgin" and is packed in iron or steel flasks containing a net weight of 76 pounds (34.5 kilograms). Exceptional uses may require redistilled or triple distilled mercury in which latter case the purity exceeds 99.9% plus with a non-volatile content of not over 0.002%. This redistilled type is sold in earthenware or glass jugs containing 5, 10 or 20 pounds.

The uses of mercury can roughly be divided into four classes; chemical, mechanical, electrical, and heat conduction. These classes could be consolidated into consuming industries and those in which the metal acts as an agent but remains unchanged in character. Of all classes (with the exception of the potential use in the mercury boiler) the use in the chemical field accounts for the greatest amount.

Compilations showing the amounts of mercury used by different industries unless taken for a period of years

are of no value. The chemical industry accounts for about 40% of the mercury used in this country and in such an estimate the production of caustic soda, chlorine, acetic acid and fulminate are not included. The common procedure is to class as chemical users the producers of such compounds as calomel (containing 85% mercury), corrosive sublimate (74% mercury), white precipitate or ammoniated mercury, red and yellow oxides and a host of organic mercurials of which the most commonly known is mercurochrome. The uses of calomel and corrosive have changed considerably. First used as a purgative and germicide, their largest uses today are singly or in combination with another organic mercurial as seed disinfectants and the prevention of fungus growth or brown patch on lawns. White precipitate is strictly a medicinal product as is yellow oxide—the common ophthalmic ointment. Red oxide is the base, however, of paint for ships hulls, in the application of which the reaction between the chlorine in sea water and the oxide results in the formation of the poisonous bichloride thus preventing and killing barnacle growth. Corrosive sublimate accounts for about 50% of the total of this group and calomel 30%.

Acetic acid, caustic soda and chlorine are chemicals, but the mercury used in the production of these materials is in the form of a catalyst; in the case of acetic acid as a mercury salt and in the case of chlorine and caustic soda as one of the anodes of a cell in which brine is converted into sodium amalgam and chlorine, the former changing to caustic soda in the presence of water. The use in such industries is a variable one. New installations will require a quantity; maintenance calls for little—but that little is at least 10% of the total consumption and note this is for maintenance only. Approximately half of the caustic soda output for 1937 was made by electrolytic methods.

Value of Mercury Fulminate

Although claims have been advanced for years as to possible substitution there is one answer to the value of mercury fulminate as a detonator and that is the rise in price of mercury due to any pending or real war. Aside from its martial aspect its use in mining, highway construction and excavation make fulminate still a most important product, and these substitutes are not 100% but a mixture of other compounds with fulminate. Not a large quantity is used in dyestuffs, probably several hundred flasks a year; but the only permanent red pigment is vermilion, used so long ago as to be known as Chinese vermilion from the fact that the lacquer boxes from China were so colored. Its real application today —and it is the only use of the metal which fluctuates with price—is in the coloration of dental rubber. Vermilion is a polysulfide and chemically similar to the ore cinnabar. This industry was a thriving one until recently when German, Italian and English materials were imported, particularly Italian. The domestic manufacturer has one advantage—shades are numerous and demand for such shades unpredictable. The importer cannot stock all. As many as 6000 flasks were formerly used in a year, but now probably 2000 to 2500 satisfy the demand of the few manufacturers of vermilion.

Our felt hats would have the same texture as blotting paper without the use of a mixture of mercury and nitric acid which is used in a process termed "carroting." This treatment permits the hairs to "felt" and form a hat body. Although here also there has been talk of substitutes, so far they have made no great inroads and the hat industry consumes in good years upwards of 3000 flasks. To the layman mercury is the material inside a thermometer—true, but how thin that column is! Not a great quantity is used for thermometers; but if all instruments depending on mercury such as barometers, time clocks, sphygmometers, were grouped together, the amount would be sizeable, certainly 500 flasks a year. Allied to these uses which are termed mechanical is the use in gas governors, an ingenious use in condensation of a refrigerating gas, the use as the bed for floating compasses and in lighthouses.

The Venturi Meter for measuring the flow of gases and liquids uses the displacement of a mercury column to indicate volume. Such a use accounts for at least 1000 flasks a year in normal times. It is probably not correct to list the manufacturer of battery zincs under the heading of electrical uses, but the small amount of mercury amalgamated to the zinc prolongs the life of primary batteries and the widespread use of such batteries makes it an important outlet for the metal—say over 100 flasks a month. Truly electrical, however, is the use in the manufacture of vapor lamps, arc rectifiers, signs and switches. Mercury vapor lamps have unusual as well as therapeutic uses, they detect forgeries and flaws in gems, radiate healthful light (through quartz), and have certain germicidal properties. Mercury arc rectifiers are commonly used and certainly with the advent of oil burners and, hence, thermostats in private homes, the increase in use of the mercury switch is not unexpected. Not a large amount is used in signs; it is used mostly as a conductor for the electrical energy, the color being due to other gases. These uses must account, however, for at least 750 flasks a year.

Mercury is not used in electric light bulbs, or in radio tubes. It is used in the mercury diffusion pump to gain the high vacuum desired. The amount is small and relatively none lost in operation. A novel use, however, is in the maintenance of constant speed in dispatching and transmitting telegraph apparatus, a use which has permitted the multi-cable. Contact formed through a bed of mercury permits a wider swing of a welding arm. These uses are interesting but the volume is not large.

There should be a fifth classification of uses—the oldest and the basis for development of mercury throughout the world—amalgamation. With the discovery of the cyanide process, this use in the treatment of gold and silver ores was largely discarded, but with the pres-

ent high price of gold hundreds of individuals have joined the men of the past who gained their fortunes or lost all through this property of the metal—and not all the present users are individuals. Certain fusible alloys for fire protection have mercury as a component. Certain electrodes use the metal. While the dental trade accounts for a considerable quantity—about 300 flasks a year—the renewed interest in placer mining accounts for the majority of mercury used for amalgamation purposes.

Largest Potential Use

Potentially the largest use for mercury is in the generation of power. W. L. R. Emmet of the General Electric Co. developed a process in which, fundamentally, volatilized mercury turns one turbine, is then led into water, giving up its heat to convert that water into steam which then turns a second turbine, the mercury being liquefied upon contact with the water. This process first installed in the Hartford, Conn. Electric Light & Power Plant has passed through the usual periods of trouble and is now in operation at the General Electric Plant at Schenectady and the Public Service Plant at Kearny, New Jersey. These two later installations both contain approximately three hundred thousand pounds or four thousand flasks of mercury. They have a total capacity of 45,000 kw., thus using about 6⅔ pounds of mercury per kw. of capacity. The original estimate called for 15 pounds. Powdered coal is used as fuel and the boiler pressure is only 140 pounds per square inch. The mercury circulates seven times an hour and the loss in operation is less than 1% per annum. In fact, so minute is the loss that a tablet of calomel dropped in the open stack is detected. It is claimed that under no other system is power generated so economically. Saving of space prompted the suggested application to vessels but so far this has not been accomplished. With smaller units and a more normal increment in the amount of power generated, the potential consumption of mercury in this field is enormous. If all such new power generated was supplied by these boilers, the entire history of the mercury industry would have to be rewritten.

Allied to this use and also presenting vast potentialities is the application of mercury for constant heat treatments. Such applications are in practice at petroleum plants and chemical plants where the value of constant heat from mercury is rapidly being appreciated.

There are certain theorists—free traders—who hold to the fact that no impediment in the nature of a duty or bounty should interfere with the movement of commodities. Should we practice such a policy the present mercury industry in this country would be in a doubtful position. Certainly it would be difficult for the U. S. with ore testing less than .5% to compete with Spain whose output originates with ore assaying at least 7% and with Italy having ore of better than .8%. But aside from these physical factors conditions in this country are vastly different from those in others. The production of mercury in Spain has since its beginning been under the control of that Government. Earlier owned by the Crown, sales for over 80 years, preceding 1922, were made through the London Branch of the banking house of Rothschild in return for a loan to the Spanish Government. The exact terms of these contract periods of ten years each are not known except that a commission and percentage of any price in excess of the contract figure proved so profitable that in 1922 this arrangement was broken and the Counsel of Administration of the Almaden Mines assumed the selling. Obviously the mines knew little of actual merchandising and in 1924 an agreement providing for successively larger discounts on increased purchases was so unsatisfactory that sales were then turned over to a new organization—Sociedade General de Mercurio—which functioned until October, 1928, when an Italian was finally instrumental in consolidating the Spanish and Italian interests and formed the Mercurio Europeo whose headquarters were Lausanne, Switzerland. The theory and practice was excellent as witnessed by the fact that the largest stocks ever above ground were coupled with a price of over $100.00—and if the Spanish Revolution of 1936 had not taken place—this arrangement would likely have been continued. At first direct sales to consumers were attempted with sales prorated 55% to Spain and 45% to Italy, but the value of the merchant was underestimated and arrangements were made four years later to appoint as a selling agent a company who guaranteed to take a minimum volume but who had a certain leeway in price. With the Spanish war this was again changed and while the Spanish metal is still sold by this agent, the Italian material is now handled by another company who strangely have the same personnel.

The present chief source of Italian metal was formerly the property of the Austrian crown. When it was turned over to Italy in 1920 a commercial bank did the financing, but with the recent corporation act this property and all mines are wholly government owned. In Mexico there are a number of small mines, but since most are financially unstable it was easy for an individual to effect control of the major portion of the output from that country which today is sold at a price based upon the London market.

In the case of Spain and Italy we are dealing with properties operated for centuries. Mexico, at present, is an indefinite factor. Conditions in this country are entirely different. In Spain and Italy, government control and a few mines. In the U. S., individual operation and many mines. Recall that this country was the world's largest producer until as recently as 1917—in 1877 producing nearly 80,000 flasks and in 1879 exporting over 50,000 flasks. While we really needed no import duty during those days a rate of 10% was included in the 1883 Tariff, changed to 10c per pound in 1890, lowered to 7c in 1894, replaced at 10% in 1913 and increased to 25c per pound in 1922 which rate still applies.

It is now evident that our ore reserves have been seriously depleted, but the adventuring spirit of the miner carries on. We are faced with a number of small mines, uneconomic and financially unstable. (The major portion of the output, it is to be noted, is still in the hands of mines operating for the last 50 years.) Contrast the compactness of the situation in Spain and Italy and it is no wonder that this market experiences undue and unnecessary fluctuations in price. It does seem ridiculous, considering that this country must import part of its needs, to find that for thirteen years prior to 1937, the differential between the London and New York markets was less than the import duty. In the year 1931 we exported 4984 flasks and the average price in this country was more than $2.00 a flask below London, meaning that with a production of about 25,000 flasks the producers threw away or wasted 25,000 times $21.00 ($2.00 plus the import duty of $19.00) and notice that in the next year, 1932, we again imported 3886 flasks.

Of course production must be relatively constant and buying is never so. Particularly is this true with the American manufacturer who buys on any upward movement and who is not interested when prices, in his opinion, should be lower. Governmental interference should not be considered. We have low tenor ore, but we have engineering ability, courage and we should have sufficient intelligence to market the production of mercury in this country in a sensible manner. As a natural corollary to this control abroad (both from a physical and governmental viewpoint) it is useless to discuss the reason or cause for price fluctuations. It is only necessary to bear in mind that aside from its peculiarity as a metal mercury is a commodity which does not obey the price law of supply and demand since there is no substitute for the greater portion of its uses. Witness the fact that the world's production in 1896 was 126,000 flasks with a price of $35.00 and in 1930, 109,000 flasks with a price of $115.00.

Five countries are consumers of the major portion of mercury produced in the world. The United States, Germany, Great Britain, France and Japan rank in the order mentioned. England normally imports twice the amount consumed, reexporting the difference. In 1937 England's net imports were 21,800 flasks, Germany's 25,900, Japan's nearly 15,000 and the consumption in this country (excluding stocks in bond) 31,000 flasks. Italy, Spain, and Mexico are the suppliers of these quantities.

The manner of marketing mercury does not differ from any other commodity. It is bought and sold in the open market. At present the group controlling the sale of the Spanish (and Italian) output do attempt to restrict their sales to consumers. This theory of direct sales is an interesting one—attempting to prevent material from finding its way into the hands of merchants—but since merchants are the balance wheel of trade any effort to eliminate such a medium has ultimately met with failure. Rothschild recognized this when selling the Spanish output and when a few years ago the Spanish-Italian cartel reduced its price to effect a sale of several thousand flasks to the U. S., it tacitly admitted the fact. It must be remembered that the 100 flask buyers are few and that at least half of the mercury sold is in units of 25 flasks or less. In this country several attempts have been made in the past to band together the various producers, but the envy or suspicion of some (principally the smaller mines) has always resulted in the collapse of such schemes. This is to be regretted. The financial weakness of the smaller mines naturally reduces a quiet market to the lowest level. Consumers are more interested in continuity of supplies than a price range of a few dollars. Consolidation of sales of these marginal producers coupled with the cooperation of the larger mines would eliminate a tremendous waste of money. Today there are but few mines in this country who sell through an appointed agent upon a commission basis. Purchases are made from producers by merchants who carry stocks and sell to consumers. That these merchants' interests and the interests of all the mines should be jeopardized by these smaller producers is an indication of the need for serious consideration of this phase of the mercury industry in this country.

The unit of sale is the flask of 76 pounds net and the price is always expressed in terms of flasks—not pounds. Terms are net cash 10 days—a lapse from the correct terms of net cash—and in some instances these terms, through the anxiety to sell, are extended.

A correct estimate of ore reserves in this country is not possible, the character of the ore making any such estimate a hazard. Blocking out of ore reserves is not practiced to the extent which good judgment would seem to require. A mercury mine cannot be closed for any period of time, reopened and start production within much less than a year.

Since mercury is a vital factor of military preparedness the proper protection of supplies is a problem which should be given serious thought. Continental Governments maintain "stock piles." This country could best do so by purchasing foreign metal when prices are low, keeping its domestic metal in the form of ore which would naturally become available upon any radical increase in price due to any contingency.

Uses for mercury have changed. The cause of its major development in this country—and in others—no longer exists. Less mercury will probably be used in actual chemical manufacture. The future of the metal lies in its increasing use in mechanical fields creating cheaper power, cheaper chemicals and assisting mankind to a fuller life through its "liquid silver."

	1933	1934	1935	1936	1937
Production—(Flasks) World	59,828	76,937	100,339	....	....
Production, U. S.	9,669	15,445	17,518	16,569	16,508
Number Producing Mines ..	75	93	90	87	101
Average Price per flask N.Y.	$59.23	$73.87	$71.99	$79.92	$90.18
London	$41.64	$56.15	$60.74	$64.33	$69.65
Imports (Flasks)	20,315	10,192	7,815	18,088	18,917
Apparent New Supply (Flasks)	29,700	25,400	25,200	34,400	35,000
From Domestic Mines (Per cent.)	32%	60%	69%	47%	46%

Should Salesmen Be Chemically Trained?

By Ernest R. Bridgwater

Manager, Rubber Chemicals Division,

E. I. du Pont de Nemours & Co.

I HAVE seen businessmen and tried to be one. I have seen chemists and I aspired to be one. I think I know a few of the things that it takes to achieve commercial success in the highly organized industrial society in which we live these days, and they are really very simple.

I said the requirements are simple to state. I think a successful man in any commercial enterprise is a gentleman who is skilled in the art that he is trying to practice. That is, I think, a very good definition. I shall not try to elaborate on what I mean by gentleman, except to remind you that I think we can be quite certain that the day when the domineering bully is able to make his mark in the industrial world is past, and that today success in industry requires first of all, that a man be honest, straight-forward, square-shooting, a man who commands the respect of his associates, the respect of everyone whom he has to contact. Perhaps there is a requirement that we must add to the one that he is a gentleman, and that is, that he be a gentleman practiced in the art of living with other men.

I have been asked whether putting a man into sales work would convert an introvert into an extrovert. Well, perhaps so, but I am sure that many boys who graduate from college as introverts are converted into extroverts not because they are put out into sales work but because they are put out into a place, wherever it may be, where they will have to rub shoulders with and live with their fellowmen, all kinds of men.

But aside from being a gentleman who is aware of the ways of the world and skilled in the art of living with other men, it takes a bit more than that, for a man to be a success in this commercial world must be skilled in the art that he is trying to practice, whether that art be wood working, or banking, or electroplating, or cost accounting, or whatever it may be. An education, and I think particularly a technical education, helps a man to acquire those skills, develops in him habits of mind that make it a great deal easier for him to become a skilled electroplater, if you wish, than one who has not had that advantage. A technical education, if attained under the right auspices, if attained in an institution of learning, which conforms to Mark Hopkins' requirements—which you will recall had to do with the student on one end of the log and the instructor on the other—should teach a man to observe keenly, to draw logical conclusions based on the observations that he gathers in with his five senses, and to acquire a challenging habit of mind that banishes superstition. By "banishes superstition" I mean a habit of mind that causes him to accept only those theories, conclusions, beliefs, which he is able to confirm by reasoning, based on the facts that are before him.

So, an education, particularly a technical education, does help a man to acquire the technical skill which it is difficult, although by no means impossible, for him to acquire without that advantage.

These basic requirements for commercial success which I have been talking about apply as much to success in production management as they do to success in sales management or salesmanship, whatever that may be. They apply, in fact, to a greater or lesser degree, to all commercial ventures. Of course, the degree in which each of these requirements is required depends upon the particular vocation in which our subject is engaged. For example, a research chemist has exceptional need of those orderly habits of mind and that habit of challenging widely held beliefs which are fostered and developed by sound technical education. The research chemist, perhaps, has less need of that ability to live with other men, although he is by no means free from the need of that ability. But certainly the plant manager has more need of that particular kind of social skill than the research chemist, because he is forced by the nature of his vocation to come into contact with more men. It is a larger portion of his job to sell himself, in the common vernacular, to his employees and to his associates than it is with the research chemist who has fewer human contacts.

The "peddler," of course, also has great need of that social experience, because he, by the nature of his vocation, is forced to come into contact with a great many men and is required, if he is to succeed, to plant his ideas into the minds of other men, but hardly to a greater degree than is the production manager required to display that skill.

But all of these men have one thing in common, this one requirement for success, that they must be skilled—that is, they must have technical skill in the art that they are trying to practice.

Extemporaneous address before the N. Y. Chapter, American Institute of Chemists, Chemists' Club, Feb. 17, '39.

What kind of technical skill does the salesman need? The salesman needs technical skill in the arts that are practiced by his customers. He requires little or no skill in the arts that are practiced by those employees of his corporation who are engaged in producing the goods that he has to sell. But if he is a good salesman he ought to know as much, or, if possible, more about the technical problems that face his customers than his customers themselves know.

That means that a salesman who is selling manufacturers' goods to firms who are engaged in chemical industries ought to know something about the particular kind of chemical industry, the particular branch of the chemical industry that is practiced by his customers. I use that term "chemical industry" in the broad and I think correct sense, to denote any industry that is engaged in changing the constitution of matter, that is engaged in transforming its raw materials, rather than in merely changing their shape.

A salesman who is selling chemicals need not necessarily have any chemical skill at all. Suppose you are selling refrigerants. They are chemicals. They are chemicals into whose research and development have gone some of the best chemical brains, but if you are a good peddler for refrigerants you need know nothing about the chemistry, about the chemical processes by which coordinative fluorinated hydrocarbons are made. However, you ought to know a great deal about refrigeration engineering.

On the other hand, you may not be selling chemicals at all, but if you are selling machinery, files, evaporators, what-not, to a chemical manufacturer, you have less need to be skilled in the arts of metal working which are the skills required by those who are engaged in producing the apparatus and equipment you have to sell than to be skilled in the chemical arts, skilled in the arts that are practiced by your customers. Hence, the kind of peddling in which chemical knowledge is required cannot be defined by the offhand statement that one who sells chemicals would do well to know something about chemistry. It is much more accurate to say that one who sells to firms or individuals who are engaged in the practice of commercial and industrial chemistry ought to know something about the particular branch of industrial chemistry that is practiced by his customer.

High Pressure Salesmanship

You sometimes hear it said that the day of the high pressure salesman is gone. That is erroneous, at least so far as the sale of manufacturers' goods, manufacturers' raw materials and manufacturers' apparatus and equipment is concerned. In that respect the day of the high pressure salesman was never here. That type of commodity was never sold, in the true sense of the word, until it was sold by men who were not salesmen but by men who knew their customers' business so well that their customers were able to conduct their affairs much better with their advice than without it.

Those skills, the knowledge of the arts that your customer is trying to practice, are usually not acquired in any institution of learning. All that can be acquired in an institution of learning are the habits of mind which enable one to acquire the art more readily, and a few basic fundamental facts of science which enable one to reason not only on the basis of his own observations, but on the basis of the observations of the myriad of distinguished scientists who have gone before him, who took the pains and had the kindness to record their observations and conclusions.

So, if you have a son who wishes to sell apparatus and equipment to a chemical manufacturer, who wishes to sell chemicals to another chemical manufacturer, be that a chemical used by a tanner of leather, or a maker of glass, or a maker of steel, or a maker of rubber goods, I am sure that you will give your son an excellent start toward success in his chosen profession by providing a chemical education for him. But he will not be competent to sell ceramic chemicals until he has learned the ceramic arts. He will not be competent to sell rubber chemicals until he has learned the rubber art. He will not be competent to sell tanning agents until he has become a tanner. And today he is exceedingly likely to fail in selling chemicals, in selling products, or apparatus, or equipment to any chemical industry—using the term in its broad sense—unless he has first acquired an intimate and detailed familiarity with that art, because whereas, before the War he didn't have the competition of men who do know the customer's business, today, in any one of the lines I have mentioned—and a hundred more I haven't mentioned—he will find that the salesmen with whom he has to compete are salesmen who know their customer's business.

I think that salesmanship, if there is such a thing, is just as simple as that. A salesman is a gentleman. He is a gentleman who is skilled in the art of living with other men. He is a gentleman who knows his customer's business, who knows his customer's business more intimately and in more detail than his customer, himself, knows it, if that is possible, and it not infrequently is. He is intellectual, honest, has an inquiring habit of mind. He is a square-shooter. He has not only a superficial knowledge of his customer's business, but he has a detailed practical knowledge which has been gained at some time in the past by actually practicing the arts which his customer is engaged in practicing. I might add that this is true of selling, not only in chemical industries but in selling in all industries.

I think it is a great mistake in thinking or speaking of the salesman type to say, "This man is a salesman, this man will make a good production manager." No, they will not succeed in either profession unless they are, to repeat once more, skilled in the art of living with their fellowmen.

The Rise and Development of the Wood Naval Stores Industry

Part 1

By William Garvie

THE first ray of hope of easing the pressure on the gum rosin industry occurred about 1900 when Homer T. Yaryan of Toledo, Ohio, began to experiment along new lines. U. S. Patent No. 915,-400, dated 16th May 1909, was issued to him; this, coupled with a further patent dated 16th May 1911, marks the true beginning of the wood naval stores industry. The term "Wood Naval Stores" can be defined as "those products derived directly or indirectly from the treatment of dead pine stumps". Like most other definitions this too has its limitations and might be extended to include the products of the destructive distillation of wood. If one must be academic then adopt the term "Steam Distilled Wood Naval Stores," but it is too cumbersome for commercial usage.

Returning for a moment to the historical aspect—Homer T. Yaryan and his associates erected in 1909, at Gulfport, Miss., a plant in which his process was worked. In the first operating year—viz: 1910/1911, it produced 14,000 barrels of rosin, 1,700 barrels of turpentine and 700 barrels of pine oil. The Yaryan Naval Stores Company is no longer in existence as such. In 1913 the Newport Co. commenced operations, to be followed by the Mackie Pine Products Co. in 1918, and the Hercules Powder Co. in 1920, all of which are still in being. Others followed later, until today about a dozen are in operation.

During the season 1937/1938, production of basic steam distilled wood products amounted to 700,000 barrels of rosin, 110,000 of turpentine and approximately 5,000,000 gallons of pine oil. Wood rosin in that year represented 30% of the total production of rosin in the United States.

Before discussing the extraction and refining processes a few words about the stumps. These have been thoroughly weathered; the outer sapwood has rotted away leaving the heartwood, which alone has any worthwhile content of recoverable products. To accomplish this condition a minimum of ten years weathering is essential.

The oleo-resin exuded by the long-leaf pine of the Southern states is essentially a solution of rosin in turpentine. Turpentine at the moment of exudation is practically pure pinene. The rosin to turpentine ratio is roughly 3:1. The stumps contain approximately 20% of extractable material, made up of rosin, pinene and many other terpene hydrocarbons, together with the terpene alcohols, etc., which go to form pine oil. It is evident therefore that some of the pinene originally present in the living tree has undergone profound chemical changes as the result of prolonged exposure. On the average, one ton of stump wood will yield 360 lbs. rosin, 56 lbs. turpentine and allied substances, and 30 lbs. pine oil—a much different ratio to that obtaining in the actual oleo-resin—accounted for mainly by evaporation loss of the liquid constituent. The products it is desired to extract and separate fall into four main groups—rosin, turpentine, dipentene, etc., and pine oil.

The first problem which confronted the pioneers was to find a cheap method of reducing the wood to small size. A good many years passed before engineers were able to design and produce machinery which would accomplish this successfully.

The extraction processes are of two types:—

(a) Distillation of the volatile constituents by live steam, saturated or superheated, followed by solvent extraction of the residual rosin, or
(b) treatment of the wood by a solvent filtration, and subsequent distillation and fractionation of the solution.

The latter method is today the more generally employed. Extraction is rarely pushed to the limit, the end-point is decided by economic considerations. Unfortunately time does not permit a close description of the extraction operation. It is, in general, carried out by filling the extraction towers or retorts with the prepared wood, which is supported by a false perforated bottom through which steam and solvent can be passed. These retorts are anything up to 20′ high and 8′ diameter and are usually constructed of a non-corroding alloy to resist the attack of the formic and acetic acids present in the wood, ensuring that the rosin will be free from metallic contamination. The extraction is usually of the counter-current type, batteries of retorts are connected in series, the solvent flow being

William Garvie, technical representative abroad for the General Naval Stores Division of Newport Industries, reviews the early history of the wood naval stores industry, briefly discusses manufacturing processes, enumerates the various types of wood rosins, compares the properties of steam distilled wood turpentine and gum turpentine, and reports on some of the newer products and what they may mean to industry. The article is a digest of a lecture delivered before the Birmingham Paint, Varnish and Lacquer Club, Birmingham, England. Part II of this article will appear in April.

arranged so that the last one which has been under extraction receives the fresh solvent. The alternation of cycle follows standard practice. When the extraction has been taken to the predetermined point, the vessels are drained off and the residual solvent recovered by steam distillation of the exhausted chips. The solvent employed in process (a) is usually a petroleum naphtha boiling between 100° C. and 150° C., process (b) requires an entirely different one. The next steps vary from plant to plant, but they all lead to the point where we have a solution of rosin in solvent and a separate solution of liquid terpenes, or a mixture of them freed from solvent by a preliminary fractional distillation. Let us now consider the rosin solution. It is pumped while hot into tall vessels where it is given a preliminary refining to remove certain oxidized bodies soluble in the hot solvent, thereafter the solution is filtered free of any powdered wood which may have come through. To recover the solid rosin the solution is evaporated under reduced pressure in film type evaporators. The product so obtained is FF wood rosin.

The commercial value of a gum rosin is, broadly speaking, a function of its color, in normal conditions of the market. The paler, the dearer. FF color grade, lying between E and F—a special position reserved for wood rosin—is at the low priced end of the scale.

The second major problem confronting the wood rosin producers, lay in the fact that the recovered rosin, being of FF color grade, had a relatively low commercial value, and a comparatively restricted market. Means of producing paler grades from FF simply had to be found.

FF wood rosin, when viewed by transmitted light, has a deep rich ruby color; there are present, however, yellow and brown color bodies masked by the ruby color. They become noticeable if FF is used in say paper size or in admixture with white pigments. These color bodies are not found in gum rosin. A successful decolorizing process must not only remove the visible ruby red, but also the yellow and brown color bodies, which have high staining power.

Both decolorizing processes satisfy this condition to a practical degree. They must also be under complete control to allow of the manufacture of any color grade at will. One process is based on the use of decolorizing earths, the other works on the selective solvent principle.

To appreciate what is to follow it is necessary to go back to FF wood rosin again. This rosin has a lower melting point, acid value and ester value, than American gum rosin. It is prone to crystallize under certain conditions and its chemical reactivity is also lower than that of gum rosin. Nevertheless, a large and important market has been developed for it. Some of these defects persist even after the refining process just outlined, though the melting point and acid value have risen.

The wood naval stores industry has the advantage of the gum industry in as much as the raw materials contained in the stumps show no practical seasonal or geographical variation in quality or properties. The recovery processes too are under complete control. It has, then, a very sound foundation on which to build up modified types of rosin.

We shall now consider the third important development, i.e. the production of specialized types of rosin.

FF wood rosin, as already stated, suffers certain disabilities when compared with gum rosin, some of these disabilities persisting through the refining process. A remarkable measure of success has attended the efforts to overcome these defects—and has led to the production of certain brands which are distinctly superior to gum rosin in given directions. Wood rosins can be divided into five broad groups:—Natural, physically treated, chemically activated, soda treated, combination treatment.

Natural Wood Rosins

Are those which have not received any specific treatment other than decolorizing. They find their chief use in the manufacture of linoleum, ester gum and synthetic resins, and in size making by the delthirna process for which they are particularly suitable. Natural wood rosins decolorized by selective solvents may have somewhat wider applications.

Chemically Activated Rosins

These rosins contain a minute trace of a catalyst, too small to influence the properties of the rosin other than in the desired direction. They will react in a most satisfactory way with glycerol, lime and the hardening metals. They are excellent for all the normal requirements of the paint and varnish industry. Among their chief uses is the manufacture of ester gum.

Physically Treated Rosins

Rosin consists essentially of abietic acid which can exist in a number of isomeric forms. Isomeric changes can be brought about by the application of heat, conferring new properties on the rosin. This subject has received particularly close study as a result of which a great mass of information has been accumulated, and put to practical use. Physical treatment therefore means the application of heat of varying temperatures for varying times, coupled with conducting the operation under different pressure conditions and in the presence or absence of steam. The knowledgeable manufacturer can ring the changes on these variants to enable him to produce a wide range of wood rosins, each with highly specialized and often extremely valuable properties.

It is not intended to infer that isomeric changes are the only ones which take place.

Physical treatment can be designed to confer high solubility characteristics and consequent freedom from crystallization in the molten condition or in solution. Wood rosins of high solubility are commercially available and are in fact well-known and appreciated.

Physical treatment is also arranged to raise the melting point and viscosity, both of which can be made greater than that of any gum rosin available today. Physically treated wood rosins have a high reactivity towards lime and the hardening metals.

Soda Treated Rosins

These are of no practical interest to the paint and varnish manufacturer. They have been reacted with a small quantity of alkali = 1% Na_2O— and are used chiefly in the soap and paper industries.

Combination Treatment

Some of these methods of treatment can be combined. Developments along these lines are proceeding apace.

Each of the principal color grades contains a rosin coming under each of the given headings. There are therefore a great number of individual brands, one manufacturer alone listing about sixty.. Very complicated apparently, in practice not so. Understandable now is the fact that merely designating a wood rosin by its color grade, say e.g. "N", is not sufficient to identify it to any but your regular supplier. When seeking a new source of supply or perhaps a rosin more suited to requirements than the one in use, that use should, whenever possible, be disclosed; much time and trouble can be saved in this way.

Special treatments do not always alter the physical and chemical constants, two rosins made by one manufacturer can have exactly the same specification yet differ in their working properties. Equally, two rosins made by different manufacturers may have the same properties, but differ in constants. It is no uncommon experience for a buyer who has been using gum rosin or wood resin when contacting a new source of supply, to demand the same acid value, etc., as the rosin conforming to the chemical specification established for an old one, and who could not be convinced that the specification he submits would not necessarily describe the best new grade for his purpose. If a clearly defined grade of wood rosin is purchased to the maker's specification, that specification will hold good for it indefinitely. It is very rare to find a wood rosin not up to its particular specification.

This broad outline by no means covers the whole field of special treatment. New methods are being sought continually and important advances are rapidly taking place. Rosin is a far more complex substance than the simple formula for abietic suggests. Few of the advances in the treatment of rosin or the preparation of useful derivatives have been arrived at from the theoretical side. They have resulted from the great mass of empirical knowledge acquired by diligent experimentation—in other words, from sheer experience.

Manufacturers of pale wood rosins are jealous of the purity and cleanliness of their goods. The conventional rosin barrel of commerce is a poor receptacle for a high grade product. Quite a deal of thought has been given to the best method of packing, very thin iron drums are now practically standard for pale grades. These have many advantages, loss of contents is eliminated, complete cleanliness ensured and quite marked savings in transport costs accrue.

I would like to summarize very briefly the advantages offered by wood rosin:

(1) Extreme degree of mechanical and chemical purity; (2) Strict standardization of quality and color grading; (3) Special qualities for a given purpose; (4) Packing designed to preserve cleanliness and purity.

To these may be added the backing of a highly organized technical industry, profoundly interested in consumers' problems and anxious at all times to keep consumers posted on all new worth-while developments.

To throw the good qualities of wood rosin into high relief, mention must be made of its only important disability. Mineral oil solutions of wood rosin have a distinctly inferior di-electric constant to equivalent solutions of gum rosin, rendering them less suitable for the manufacture of insulating oils. Curiously enough, the di-electric constant and specific resistivity of the two are practically identical when determined on the solid rosins.

During the last ten years the American paint and varnish industry has shown a distinct tendency to purchase intermediate products from outside sources rather than to manufacture them internally. There is much to be said for this point of view. Manufacturers can rarely hope to acquire that intimate and detailed knowledge of primary raw materials which the actual producers possess. This is especially true of wood rosin. Furthermore, they are unlikely to possess the costly and specially designed plant which is necessary. It is not surprising then, that the larger wood rosin producers have been called on to offer such commodities as limed rosin, gloss oils, zinc hardened rosins, etc. The manufacture of derived products marks another stage in the development of the wood naval stores industry.

Catalytic Refining of Petroleum

Catalytic refining is the latest topic of conversation in petroleum refining circles. To many refinery technologists it is just another process—and there are many—but those who have developed it contend that the application of catalysis to petroleum refining is a further aid to flexibility of operation.

This element of flexibility, or the ability to produce from crude oil that product for which demand seasonally is greatest, is the long desired hope of refiners. For years they have attacked the problem of flexibility, troubled by the fact that when they produced motor fuel for summer consumption, they were forced simultaneously to produce heating oils which could not be used until winter. And when they produced the winter heating oil supply, they were also producing gasoline for which demand would not be sufficient to move the growing stocks until spring and summer.

Catalytic refining affords also the hope of producing both higher-octane motor fuels and of obtaining a larger proportion of that motor fuel from the raw material. This means better, although not necessarily cheaper, gasoline. Refiners contend that, what with distribution costs, taxes, and such, motor fuel prices already are at an economic nadir and say that no refining process yet in sight can push them any lower.

Of further help to refiners is the possibility of operating refining equipment at lower temperatures and pressures. Chemical reactions appear to be accelerated by the use of catalysts, which frequently consist of activated silica and alumina. Other catalysts are made of acid-treated clays containing oxides of the heavy metals, such as manganese and nickel. The refiner is pleased that such catalysts economically can be replaced, or, in some cases, reconditioned for additional use.

Technologists already are talking about the development of a "catalytic technique" which will enable refiners to obtain a wide variety of catalysts to meet specific refining needs. They assert the initial use of catalysts in petroleum refining has opened a dozen new doors to assorted industrial endeavors.

Refiners are spending additional millions of dollars to reconstruct and modernize their plants to take advantage of virtually everything that is being developed.

Industrial Water Treatment

1918—1938

By Sheppard T. Powell

WITHOUT an adequate supply of water, few industries could operate. Realization of this fact has resulted in the rapid development of water treatment processes during the past twenty years.

The importance of clean water has been recognized since the dawn of civilization and some present-day processes of water treatment are based upon principles practised, if not understood, by ancient races. Primitive treatment of water was merely for the purpose of removing suspended solids. This was accomplished by settling with or without the aid of coagulants. Later, various forms of filtration were employed to effect better clarification, decolorization or bacterial removal. Subsequently, softening by chemicals was inaugurated to meet the need for boiler feed uses and for other industrial processes. Later, softening by base exchange materials was discovered, thus making available an additional form of treatment for hardness removal. For more complete treatment evaporators were developed and numerous other water conditioning systems invented and applied.

Twenty years ago water treatment requirements were usually simple. Industrialists were content to have clear water free from excessive hardness and mineral matter. Specifications for industrial water have become increasingly more exacting, the result of advancement in the arts. The trend towards high-pressure boilers, likewise, developments in the textile, rayon, paper, photographic, and other industries have imposed severe demands necessitating radical improvements in water purification. This natural sequence of events has stimulated active research in the field of water treatment and has resulted in the development of complex water purification processes and the invention of many new water conditioning devices.

Practically all surface waters and some underground supplies contain suspended matter, the removal of which is required to properly condition the water for industrial uses. This is true even for water used merely for cooling purposes. The simplest treatment for clarification only is by means of plain sedimentation. Such treatment, however, can be relied upon only to remove suspended solids. Advancement in subsidence efficiencies in recent years has been along the lines of structural dimensions of basins, with respect to width and depth, and influent and effluent weirs or channels. Attention has been given also to the design of mechanical facilities for removing settled solids without taking the basins out of service. These have included de-sludging systems of pipe laterals and manifolds in the bottom of the basin, revolving mechanisms for concentrating sludge at a single point of withdrawal, or mechanically operated bucket conveyors. Such equipment generally reduces basin capacity, and its applicability depends on local conditions and economic justification. However, the average efficiency of this basin provided with a mechanical cleaning device is usually very much greater than the average efficiency of a similar basin not so equipped.

The decision to install primary subsidence basins depends largely on the economics involved and the necessity for removal of gross suspended solids prior to treatment by filtration and softening apparatus. Use of such basins is most advantageous and justifiable where the raw water supply contains extremely large amounts of suspended solids, the deposition of which in softening tanks imposes too severe operating conditions. They have been used most extensively to remove turbidity from the very muddy surface water encountered throughout the Middle West.

To aid in the removal of solids, various coagulants have been employed. These chemicals agglomerate finely divided suspended matter into larger particles, thereby speeding the rate of subsidence. Chemical coagulation, to effect clarification of turbid waters, has been long practised, but exact knowledge of the underlying chemical principles involved has only been gained within relatively recent years. During the past two decades numerous investigators have studied this aspect of water treatment, so that the chemistry involved is now fairly well understood and many factors accelerating or retarding the chemical reactions are now controlled.

Effective clarification by coagulants varies with the nature and amount of the suspended and soluble solids contained in the water. Investigation and experience have proved that the hydrogen ion concentration of the final mixture is of great importance in the production and nature of floc produced, not only by aluminum salts, but also by iron and other metallic and non-metallic coagulants. So important is this that many appliances for determining the hydrogen ion concentration of waters have been developed. In many instances the determination of the pH value and correction to the optimum point is controlled by colorimetric procedures

and apparatus. More recently, electrometric pH instruments have come into general use. Some appliances have been developed to control chemical feeding equipment. Such control is adaptable not only for the adjustment of chemicals to effect adequate coagulation, but is being employed, also, in the operation of plants for the removal of iron and manganese and for the application of supplementary chemical treatment to inhibit corrosion.

Continued research in this field will surely produce further information permitting more economical and satisfactory operation of water purification systems. Possibly the most important recent development relating to coagulation and removal of suspended solids is the acquired knowledge of the effect of mixing of chemicals and the flocculation of suspended coagulants by means of mechanically operated devices. During the last twenty years much attention has been given to this phase of water treatment and the beneficial effects and economic merits of mechanical aids to flocculation are now definitely proven. Earlier water purification systems embodied simple baffles and other static mixing devices to effect intimate admixture of chemical coagulants and water. More effective agglomeration of coagulants can be accomplished by the slow and continuous mixing of water by paddles or other contrivances. By means of such flocculating equipment the finely divided coagulum is kept continually in motion which results in rolling the particles into larger and more compact masses, thus giving large surface areas to which other finely divided particles may adhere. As the masses grow in size their weight increases, resulting in more rapid and complete clarification than could otherwise be secured.

In addition to the acceleration of coagulation by flocculating mechanisms, attention should be given, also, to the structural design of facilities for this purpose. Research has resulted in the development of numerous types of tanks and the more intelligent and scientific placing of baffles, sludge removal systems, and inlet and outlet weirs.

The Place of Filtration Equipment

The basic principles of filtration have been well understood for many years and the late development in this art has been devoted largely to the specific features of the appliances rather than to any outstanding changes in the process itself.

Rectangular gravity filters of concrete construction, as widely used in public water supply practice, have many advantages that make them desirable for private industrial water plants. In such filters the bed is entirely exposed for observation during backwashing, cleaning of the surface, and other inspection and maintenance operations. This proves highly advantageous under severe operating conditions and heavy loads. However, in many cases use of this design may be precluded by limitations of space, pumping facilities, and desired plant capacity.

Pressure filters, both horizontal and vertical types, are extensively employed for industrial purposes, but designers are devoting more attention to the vertical filters. Considerable development has taken place in providing more uniform distribution and collection of incoming and outgoing waters from such units.

Changes in the design of underdraining systems have been employed, leading towards better collection of filtered water and more effective distribution of backwash water. Likewise, more thought is being given to the use of materials for underdraining systems which will resist the corrosive effect of water. A novel and recent type of gravity filter design uses all welded steel construction and combines the coagulating basin, filters, and clear water reservoir in a compact circular unit, the various parts being built in annular sections around a central control house. The filter underdraining system consists of layers of graded gravel resting directly upon steel subway grating. The space beneath the grating is entirely open to the flow of filtered water or the supply of wash water, and all manifolds, laterals and strainer heads are eliminated. Up to the present this design has been limited to the treatment of municipal water supplies, but its adaptability to treatment of industrial waters is recognized so that plants of this type may find a place in the industrial field.

Latest Trends Reviewed

The trend is away from the combined air and wash water, which, for a time, was viewed favorably. Current backwashing practice usually employs high velocity wash water, with the elimination of the air or steam previously used for the agitation of the filter medium. Recently much interest has been shown in the use of supplementary surface washing appliances. The filter surface washing is effected by means of wash-water manifolds and laterals located a short distance below the surface of the filter bed. One such device consists of a pipe with jets, revolving in a horizontal plane. Such appliances do not replace the standard backwash water distributors but are supplementary. The advantages gained are reduction in wash-water requirements and mud ball formation, and increased length of run between washings.

Water supplies requiring the removal of iron to the lowest possible concentration, as in the rayon industry, require that waters so treated should not again come in contact with various metals during filtration or after leaving the system. These strict specifications have resulted in the use of rubber-lined filter tanks and the employment of non-ferrous metals for the distribution systems. For many years wooden filters were employed, but later, tanks of steel construction replaced them. There is some indication of a reversal of the trend again toward wooden filters of the gravity type because they eliminate the possibility of corrosion which occurs with steel tanks unless adequately protected. Since color may be absorbed from the wood, wooden

tanks are objectionable for the treatment of waters where small amounts of color cannot be tolerated.

There has always been great diversity in the types of filter medium used. These have included sand, calcite, magnetite, anthracite coal, and other substances. At present an increasing preference is for the non-siliceous materials, since they are effective for the proper clarification of water for industrial and sanitary purposes and do not increase the silica content of the water filtered. Sand has proven to be objectionable for the treatment of hot alkaline waters because of the tendency for silica to pass into solution in this type of water. As a substitute for sand, calcite has been and is still widely used. More recently, magnetite and anthracite coal, or a combination of these materials, has proven highly successful. Under some conditions graded magnetite is an excellent filter medium. However, experience with recent installations has shown that it is not well suited for filtration of hot water containing precipitated phosphates, but can be used successfully even for this purpose if the magnetite is employed merely as the supporting bed for anthracite coal. Graded anthracite coal has been used at least forty years for the filtration of water supplied to municipalities, but was not until recently employed widely for industrial waters.

Chemical Feeding Equipment

Water purification methods generally require the addition of chemicals, at various points, in doses accurately adjusted to the specific characteristics of the water being treated. The quality and flow of the water may fluctuate from time to time, and it is necessary to vary the chemical dose. During the last twenty years many ingenious devices have been invented for the delivery of chemicals in precisely measured quantities.

Some of the more important basic types of equipment for delivering chemicals are:

Positive displacement pumps which discharge accurately measured quantities of liquids.

Devices discharging liquids through orifices under pressure, the rate being varied by changing either the orifice size or the pressure.

Devices which convey dry chemicals from the bottom of a hopper at a controlled rate.

Improvement in chemical pumps has included changes of design to provide variable stroke and precision of discharge volume, the use of corrosion-resisting materials, and development of check valves and other parts capable of handling heavy suspensions, scale-depositing solutions, and other difficult materials. Special alloys, rubber-lined pumps and rubber diaphragm pumps are available for handling corrosive water treatment chemicals, and soft rubber balls have been used for check valves where sludge or scale would clog metal checks. Frequently, it is necessary to proportion the discharge of a pump to a variable flow of water and many devices have been developed for coordinating the operation of a pump with the rate of flow through meters of various types.

Chemical solution feeders depending on the flow of a liquid under pressure through an orifice have been popular because of their simplicity and the absence of moving parts. The simplest constant-feed device is a tank in which the liquid head is kept constant by a float valve supplying the chemical solution, fitted with a discharge orifice which may be varied at will. Proportional feeding through an orifice may be accomplished by varying the pressure of the solution according to the quantity of water being treated. Many ingenious variations of such orifice feeders are now available.

A widely-used type of solution feeding device is a tank supplied with a swing-pipe or hose supported on a chain or cable, so that the solution is decanted as the intake is allowed to drop. Recent improvements in this type of equipment have been mechanisms controlling this motion accurately by means of a water meter.

In a large water treatment plant, the quantity of chemicals handled may be so great that controlled solution feed is impracticable, and the feeding of dry chemicals is preferable. The chemicals are delivered from a hopper to a belt, disk, or other conveying mechanism, and emptied into a dissolving chamber at a controlled rate. In some interesting devices developed for this purpose, the conveying mechanism is a trough which is caused to vibrate rapidly through a very small amplitude by means of an alternating-current electromagnet. Although no motion of the mechanical parts is visible, the chemicals are conveyed from the hopper at a rate which varies with the current through the magnet and the angular direction of the vibration. This equipment is susceptible to proportional control with a cyclical timing device actuated by a meter.

As a result of the progress made in feeding apparatus, it is now possible to apply chemicals of any kind to water under a wide range of temperature and pressure conditions, controlling the dosage, whether large or small, in direct proportion to the quantity of water being treated. Chemical feeding devices find application in filtration, softening and special water purification processes encountered in industrial water treatment.

Water Softening by Chemicals

In chemical process softening, the lime-soda softener that was in a stage of comparatively early development twenty years ago has been greatly improved. The accurate proportioning of chemicals to meet the requirements of the water, the efficient mixing and flocculation of the precipitate, provision of adequate detention time for reaction and settling, and the effective final filtration of the supply have made it possible to produce an effluent whose hardness approaches the limits fixed by the solubilities of the calcium and magnesium precipi-

tates. Since these solubilities decrease markedly at higher temperatures, the results that are obtained depend largely on the extent to which the water may be heated consistent with the economical heat balance of the plant. In the most efficient hot process lime-soda plants it is not uncommon to reduce the hardness of the water to less than 10 parts per million, but the lime-soda process applied to cold water leaves several times this quantity of hardness.

Many early chemical softening plants for industrial water consisted of a number of tanks operated intermittently on the fill-and-draw system. The relatively long period of quiescent settling produces superior results and where feasible is still often employed. However, the demand for the maximum softening has led to the increasing use of continuous flow softeners operated at high temperatures. Some plants have been recently constructed in which pretreatment by intermittent cold softening is followed by hot process softening, by zeolite softening, or by evaporation. The intermittent tank is also used for a variety of pre-treatments other than softening.

Improvements in this type have formerly been confined primarily to the physical arrangements of the component parts of softener. The most recent developments are based on the principle of controlling the distribution of sludge so that the water under treatment is passed through a blanket of sludge with high adsorptive powers. Several different designs embodying this principle have been offered by various manufacturers, and doubtless this innovation will meet with general acceptance in the immediate future because of its economy and efficiency.

Chemical process softening has been improved by the use of numerous coagulants in addition to the softening reagents. Among those most widely employed are sodium aluminate, sodium phosphates, and iron compounds.

Zeolites and Other Ion Exchanging Materials

Twenty years ago water softening by means of zeolites was just sufficiently developed to be given attention in the technical journals. Today the base exchanging zeolites, natural and synthetic, have become commonplace. Many improvements have been brought about by experience and research. Natural greensand zeolite minerals are now treated to give them higher exchange value (i.e., capacity for exchanging sodium salts for hardness before regeneration is required) and much greater durability. Tests of the mineral to determine its serviceability and for keeping it in good operating condition are now used. Synthetic zeolites of several types have been perfected and are widely used because of certain specific advantages.

Zeolite softeners are similar in most respects to filters, and are available for operation as either gravity or pressure units, but they require the additional operating step of regeneration. Most improvements in valves, underdraining and other features applied to filters are also available for zeolite softeners. It is now possible to install a fully automatic zeolite system which can be backwashed and regenerated by electrically controlled mechanism.

The most striking development in this field, and a fairly recent one, is the perfection of materials other than double silicates which have the property of exchanging one kind of ion for another, and which are sufficiently rugged to permit their regeneration with acids or alkalies. Ions in the water may thus be replaced by either hydrogen or hydroxyl ions, and it is obvious that if both the acid and the alkaline exchange is carried out, the complete elimination of both positive and negative ions will be effected.

Just as the discovery of double silicate zeolites was prompted by observations of the changes in the composition of liquids in contact with soil, so also has it been long known that the decayed vegetable matter, generally known as humus, effects a similar change in water. Organic residues in an advanced stage of decomposition, such as lignite, are made suitable for commercial use as ion exchanging media by treating them with a powerful dehydrating agent and stabilizing them in various manners. They may then be "regenerated" with brine or a dilute acid solution, and they will retain the corresponding positive ions, i.e., sodium or hydrogen. These are given up in exchange for any positive ions in water which is subsequently passed through the bed of granular material. It is thus possible to use these carbonaceous substances as sodium zeolites for ordinary softening, where silicates may involve an undesirable risk of increasing the silica content of the water. Moreover, it is possible to use them as hydrogen zeolites to replace not only calcium and magnesium, but also sodium, by hydrogen ions, producing acids with the negative ions in the water. When carbonic acid is one of the major products, it may be eliminated as carbon dioxide and the mineral content of the water reduced accordingly. The first commercial installation of these materials in this country was made in 1936 and there are now numerous others.

Other investigators have been working with complex organic resins which would form a basic substance when treated with an alkali, and would yield the hydroxyl ion in exchange for another negative ion from water brought into contact with them. Several of these materials, which may be very broadly regarded as phenolic plastics in pulverized form, are now on the market. They are "regenerated" by sodium hydroxide or sodium carbonate solutions, and then treated with the water in which all salts have been converted to acids by hydrogen zeolite treatment. The negative ions are replaced by hydroxyl ions and the product is essentially pure water containing only the silica and materials other than salts. Commercial installations of this equipment are still in the development stage, but it may be anticipated that they will be in successful use within a few years.

Since the exchange of ions is either an adsorption phenomenon or the formation of loosely bound com-

plex compounds, many substances may be capable of performing these functions and will, no doubt, receive attention. Several inorganic colloids have already been studied for this purpose and future developments of considerable interest may be expected.

Boiler Feedwater Treatment

During the past twenty years the design of steam generating equipment has undergone rapid changes, with marked trends toward higher pressures and ratings. This development has had a great influence on the art of water conditioning, because scale, corrosion and all of the difficulties to which steam generating equipment is subject are thus enormously magnified. The improvements in boiler feedwater purification methods and equipment have been more striking than in any other field of water treatment.

The aim of boiler feedwater purification is production of a water which, when concentrated in the boiler and modified by such supplementary internal treatment as may be required, will permit the generation of steam of good quality at the desired rate without scale formation on the heating surface, or corrosion or embrittlement of the boiler metal. The ideal boiler water would contain only enough alkaline sodium salts to render it non-corrosive and serve as a safeguard against unpredictable scale-forming contaminants, with a proper balance of certain other constituents which prevent the caustic embrittlement of the metal. Since the solids dissolved in the feedwater or added directly to the boiler must be removed ultimately by blowing down to keep the concentration of the boiler water within proper limits, a feedwater of the lowest possible dissolved solids content, and which will require a minimum of supplementary treatment, is a decided asset.

Prevention of Scale

The mechanism of scale formation is now better understood and a scientific basis has been provided for preventing it by converting the calcium and magnesium, within the boiler, to a non-adherent sludge much less soluble than the compounds which constitute scale. Sodium phosphate and carbonate are used widely for this purpose. Organic substances may be added to modify the physical characteristics of the sludge. This simple treatment is entirely satisfactory for boilers operating at low pressures, if the quantity of scale-forming substances entering the boilers is not excessively high. The injection of phosphates into boiler drums is also used to supplement external softening whenever the residual hardness in the feedwater is great enough to be troublesome under the existing conditions of temperature and pressure.

It is generally accepted that, for equipment operating at high pressures, scale-forming solids must be essentially removed before the water enters the boiler. If this is not effected by distillation (which is economically practicable only when make-up requirements are small), the undesirable constituents may be precipitated with chemicals or removed by base-exchange softeners. Accordingly, it is often necessary to provide a more complete degree of treatment for boiler feedwater than for other industrial process waters. Water for use in high-pressure boilers must contain a minimum of silica, and in some cases this has necessitated pre-treatment before conventional softening methods are applied. The severe requirements for boiler feedwater quality have been directly responsible for many of the advancements in the arts of chemical process and base exchange softening previously described. These methods in many forms and combinations are widely used for feedwater purification.

Hot process softening by means of phosphates produces a feedwater whose hardness is too low to detect by routine tests. The process utilizes a reaction tank, chemical proportioner and filters essentially like those used for the hot lime-soda process, and is economically practical only for waters of moderate hardness or supplies which have been partially softened.

Zeolites for Boiler Feedwater

Softening boiler feedwater by zeolites reduces the scale-forming solids to very small concentrations and the maintenance of clean heating surfaces in boilers operated at moderate pressures may require no further treatment. The double silicate zeolites are used increasingly for this purpose. The zeolite process has the advantages of effecting a high degree of softening with a minimum of chemical control, but since sodium ions are exchanged for calcium and magnesium, the concentration of solids in the feedwater is not decreased, as is the case with methods employing the chemical precipitation of undesirable constituents. This difficulty has been overcome, when an excessively hard and highly mineralized water was encountered, by preliminary cold process softening for clarification and removal of a large part of the hardness.

Many serious boiler failures have occurred in which the metal loses its normal physical characteristics and becomes extremely brittle. The corrective measures to inhibit embrittlement were developed on the basis of a statistical survey of boiler water compositions characterizing a large number of plants, which showed that a preponderance of sodium sulfate, with respect to alkaline constituents, appeared to inhibit embrittlement. Specific ratios of sulfate to alkalinity have therefore been recommended by boiler code authorities. Since this requires a total solids concentration at least two to four times as high as the alkalinity, the maintenance of the sulfate-alkalinity ratios has been a major factor in boiler feedwater treatment in recent years and has had a marked influence on design and planning of treatment methods. One practice developed to avoid the excessive building up of total solids, which occurs when sodium sulfate is added directly to highly alkaline waters to correct the ratios, is the addition of sulfuric acid to the water to convert sodium carbonate to sodium sulfate. Another new corrective measure is the addition

of lignin compounds and similar substances to the boiler water. This is being tried on a commercial scale to a limited extent and its more general use may be justified by the results of these tests.

From what has been said previously concerning the new hydrogen zeolites and anion exchange materials, it will be obvious that the most important application of these is in the field of boiler feedwater. Waters high in bicarbonates provide an opportunity for the complete elimination of this part of the mineral content, the calcium magnesium and sodium ions being removed by hydrogen zeolite and the resultant carbonic acid being evolved as gaseous carbon dioxide. The sulfuric and hydrochloric acid produced by the hydrogen zeolite process must be neutralized to render the water non-corrosive, and this may be accomplished by adding alkalies or mixing the effluent from hydrogen zeolite and sodium zeolite softeners in proper proportion. These new methods are at the present time well established in commercial use. The more complete purification of the water by a combination of hydrogen zeolites and anion exchangers, leading to the production of a feedwater supply approaching, in quality, evaporator distillate, is an accomplishment anticipated with considerable interest.

Prevention of Corrosion

At the time when boiler operating pressures rarely exceeded 150 pounds, a moderate amount of scale could be tolerated and it was recognized that if scale were excluded too rigorously corrosion might appear. As higher pressures required the more complete maintenance of clean metal surfaces in contact with the boiler water, severe corrosion was frequently encountered with the accelerating effect of higher temperatures. Chlorides, nitrates, and other salts of strong mineral acids hydrolyze under boiler operating conditions, releasing the acid and causing active attack on the metal. Hydrogen ion measurement and control has led to the simple remedy of maintaining alkaline sodium salts in the boiler water in sufficient amounts to keep the hydrogen ion concentration extremely low at all times. Even when the feedwater is condensate and evaporated make-up, sufficient caustic soda is added or boiler blowdown is recirculated to keep the pH at a level to protect each part of the system.

In recent years it has been learned that although a deficiency of alkalinity permitted the water to attack boiler steel, even a very minor attack was rendered continuous and progressive if dissolved oxygen had access to the metal surface in question. Experience with instances of severe oxygen corrosion prompted the development of apparatus to heat the feedwater to the boiling point and drive oxygen and other gases out of solution. An open tank equipped with steam coils was regarded as adequate for low-pressure boilers, but more efficient apparatus is now required, since traces of oxygen too minute to be detected analytically may cause corrosion at the higher pressures in use today. Feedwater heaters have therefore been designed to distribute the water in a manner which will result in a maximum surface exposure, and to provide for positive removal of the non-condensable gases. This equipment, in the form of an atomizing steam jet or a tray heater, is capable of producing zero oxygen feedwater as measured by the most sensitive tests available, i.e., corresponding to less than .005 milliliters per liter of dissolved oxygen. Deaerators are now incorporated in hot process chemical softening equipment to eliminate an additional heater installation.

The best deaeration by these physical means may not assure that oxygen will not be present at some time because of unsettled operating conditions or entrainment through leaks in the feedwater system. Moreover, it is not always possible to justify the expense of equipment for the highest degree of deaeration. Several forms of chemical deoxygenation have been developed to take care of the small amounts of oxygen that may be involved in these contingencies. Reducing agents added directly to the feedwater or boiler water are ferrous hydroxide, colloidal iron, tannin derivatives, and sodium sulfite. While ferrous hydroxide has not found general acceptance, finely divided iron and iron compounds are being used to absorb dissolved oxygen. Vegetable extracts having a high content of tannin compounds, which hydrolyze and decompose to give the active reducing agents pyrogallol and catechol, have been used for a long time and are especially applicable where internal treatment of the boiler water must be relied upon to a large extent for the protection of the equipment. In recent years a marked trend is toward sodium sulfite for supplementary chemical deaeration. This treatment is readily controlled by simple chemical tests, and a small excess of sulfite is frequently carried to give assurance against chance oxygen entrainment.

A method of preventing corrosion which does not involve correction of the characteristics of the boiler water is the use of protective coatings applied to all interior surfaces of the boiler. Several of these have been developed and, when properly used, will produce a thin coating of inert material that will not adversely affect the heat transfer through the metal. These coatings are not to be regarded as a substitute for proper boiler feedwater conditioning, but have been especially useful under severe operating conditions which make it impossible to assure a non-corrosive boiler water at all times.

Problem of Equipment Corrosion

One important problem in the field of industrial water supply is the corrosion of equipment, and parallel experience has attracted study and investigation in the field of public water supply. In the last twenty years, the phenomenon of corrosion and many causes, influencing factors and methods of prevention have become much better understood. Again hydrogen ion concentration of the water is an index of its corrosiveness,

and correction of the pH by addition of alkaline chemicals is widely practised.

In new installations much can be done by the selection of proper materials of construction. Non-ferrous metals are suitable for mildly corrosive waters. In severe cases the use of cement-lined or rubber-lined pipe may be required. In older installations where replacement is not feasible, or in new installations where excessive corrosion is anticipated, the problem may be solved by correcting the pH of the water and eliminating dissolved oxygen and other gases. The deaeration of large volumes of cold water by means of a vacuum deaerator is a practical solution, and a few installations of this kind have been constructed and operated successfully. This method of control will probably be more generally used in future installations. Where a high vacuum is maintained at the deaerator, the removal of dissolved oxygen will be sufficiently complete to prevent active corrosion. If a high vacuum is not economically practical, partial degasification by vacuum may be supplemented by chemical deaeration.

Chemical Advancement in Water Treatment

The treatment of enormous volumes of water for industrial uses has had a marked effect on the market for chemicals. Large quantities of various products are used in this field. Some of the important chemicals employed more or less specifically for this purpose are liquid chlorine and chlorine compounds, softening reagents, miscellaneous coagulants, activated carbon, reducing agents, and ammonia. In addition to chemicals used directly there has been an appreciable market created for other chemicals which are ordinarily materials of manufacture, such as sodium silicate, sulfuric acid, vegetable extracts and a large group of miscellaneous products. It would be difficult to give an accurate estimate of the total consumption of chemicals for water treatment today, but it is undoubtedly a significant part of the market demand for some of the items mentioned, and, as more rigid specifications for industrial water supplies develop and require solution, there is every reason to believe that this demand will become increasingly more important to the chemical industry.

Industry's Bookshelf

Procter's Leather Chemists' Pocket Book by W. A. Aetkin and F. C. Thompson, Chemical Publishing Co., N. Y.; 394 pp., $6.00. A third edition of this practical handbook of standard analytical operations for tannery control.

Labor Conditions in Western Europe by Jurgen Kuczyski, International Publishers, N. Y.; 118 pp., $1.50. A gloomy conclusion from labor's point of view is reached after a study of wage and hour statistics, in England, France and Germany from 1820 to 1935.

Historical Color Guide by Elizabeth Burris-Meyer, William Helburn, Inc., N. Y. C.; 30 pp. A representative collection of traditional color schemes of value to all who use color commercially or artistically.

Economic Consequences of Recent American Tax Policy by Gerhard Colm and Fritz Lehmann, Social Research, N. Y. C.; 108 pp., $1.00. Facts and statistics with some immature—or possibly premature—deductions that would start warm debate in any group.

Library Guide for the Chemist by Byron A. Soule, McGraw-Hill, N. Y.; 203 pp., $2.75. A much needed book, well done, though weak on the business literature and statistics of applied chemistry.

How to Finance and Market Specialties by James Marratta, Council for Improvement Specialty Selling, 185 Madison ave., N. Y.; 110 pp. A lively bit of reading that sugar-coats some really hard facts.

About Petroleum by J. G. Crowther, Oxford, N. Y.; 181 pp., $2.25. One of our most tireless popular science writers has turned out a typically informative book about this industry and its products.

Schimmel Scientific Report 1938, published by Schimmel & Co., N. Y., 177 pp., $1.50. Anyone concerned with essential oils, perfumes, and kindred matters will welcome the news that the 1939 edition of this invaluable publication, the Annual Schimmel Report, has just appeared and is of the usual high standard to which its readers have become accustomed.

And So They Indicted Me by J. Edward Jones, Jones Publishing Corp., N. Y.; 253 pp., $2.00. The independent oil operator, whose case versus S.E.C. is the background of this book, scathingly attacks the New Deal with some pretty heavy artillery of facts and figures.

Full Recovery or Stagnation by Alvin Harvey Hansen, Norton, N. Y.; 350 pp., $3.50. Answers the pressing question of today with a thoughtful analysis of business cycles, monetary controls, pump-priming, etc.

The Tennessee Valley Authority by Clarence L. Hodge, American Univ. Press, Washington; 272 pp., $3.00. A friendly study of the T.V.A. from the point of view of its regional planning activities—well packed with facts and figures that are valuable and reaching several debatable conclusions.

Magnesite as a Refractory by A. W. Comber, Lippincott, Phila.; 114 pp., $2.00. Refractory materials loom constantly more important in chemical processing and this compact handbook will be welcome as a handy and complete reference work on the subject.

The Properties of Glass by Geo. W. Morey, Reinhold, N. Y.; 561 pp., $12.50. Latest and worthy addition to the distinguished A.C.S. Monograph Series—covers with precision all of the physical and chemical and optical properties; a most important work.

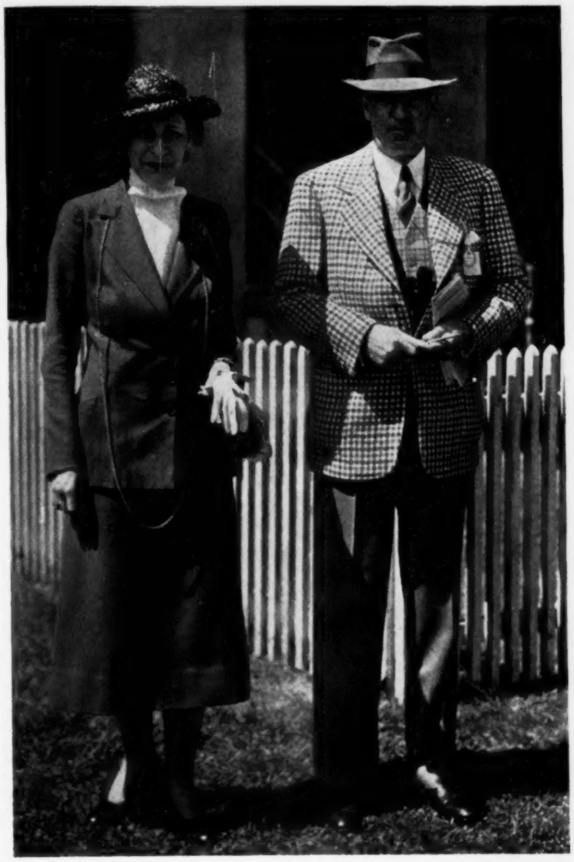
Principles of Organic Chemistry by H. P. Starck; Chemical Pub. Co., N. Y.; 664 pp., $5.00. An English importation, written by a teacher in pre-medical courses, which is a sound addition to the specialized treatments of organic chemistry tests.

The Science of Production Organization by E. H. Anderson & G. T. Schwenning, Wiley, N. Y.; 282 pp., $3.50. Markedly successful attempt to correlate the principles of scientific management to practical production problems, with particular emphasis upon its administrative aspects.

Trade Associations in Law and Business by Benj. S. Kirsh, Central Book Co., N. Y.; 399 pp., $5.00. The law very distinctly outweighs the business in this timely consideration of the trade associations and their activities.

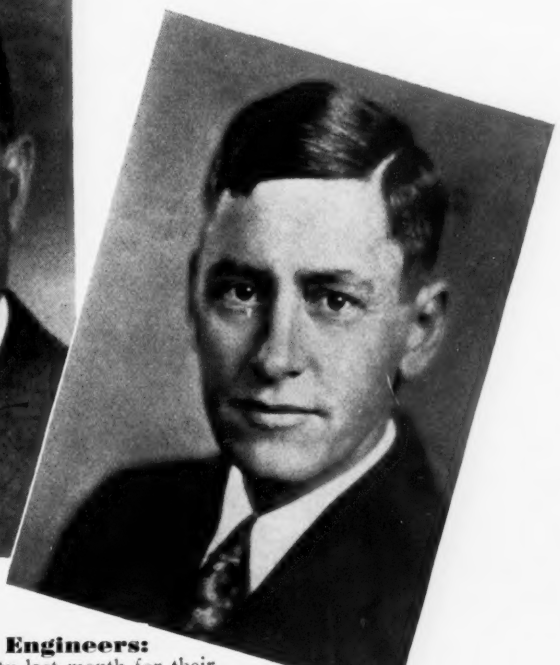
"Headliners"

Board Chairman: Edward H. Kohnstamm, for the past 17 years president of the long established firm of H. Kohnstamm & Co., has been elected chairman of the board. Now in his 82nd year, his tremendous vitality has kept him active long past the time when most men retire.



President: Lothair S. Kohnstamm, the firm's new president, graduated from Columbia in '02 and immediately started work at the Brooklyn plant, later joined the research staff. He served as a captain in the C. W. S. during the War; became secretary of the company in '22 and vice-president in '24.

"Beau Brummel": William Warren Rhodes, sales director of Kinetic Chemicals, Inc., a du Pont subsidiary, bears the title of one of the nation's 21 "best dressed men." Mr. Rhodes—he lives at "Rhodesia" at Westtown, Pa., and commutes to Wilmington—was cited for: "His faultless hunting clothes; both his field and full dress coats" by the recent convention of the National Association of Merchant Tailors and the Merchant Tailor Designer Association. Mr. Rhodes, accompanied by Mrs. Rhodes, is shown entering the grandstand at the last Rose Tree Fox Hunting Club Races.

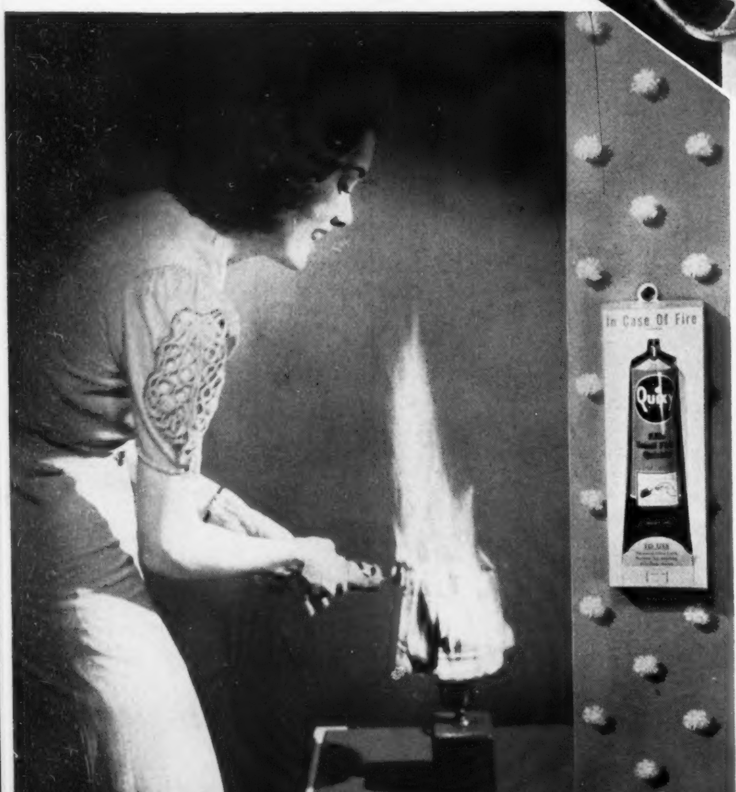


Mining and Metallurgical Engineers: Leaders of this group gathered in N. Y. City last month for their annual convention. Left to right, H. W. Gillett, chief technical adviser, Battelle Memorial Institute, who gave the Howe Lecture; Kenneth Charles McCutcheon and John Chipman who jointly received the Robert W. Hunt Award for '39 for their paper on "Evolution of Gases from Running Steel Ingots."

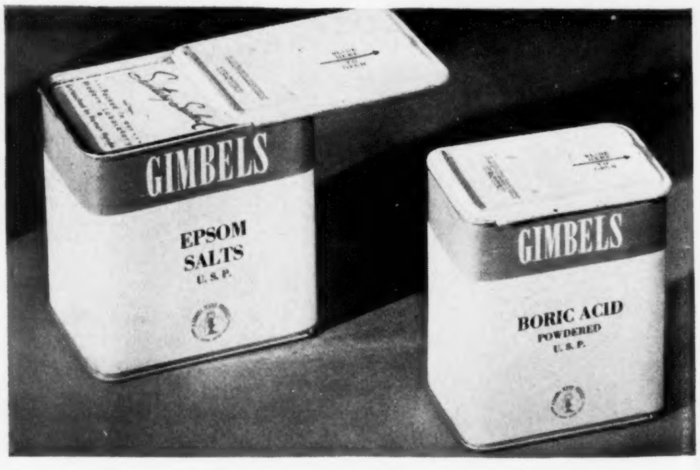
1938 All-America Packaging Competition

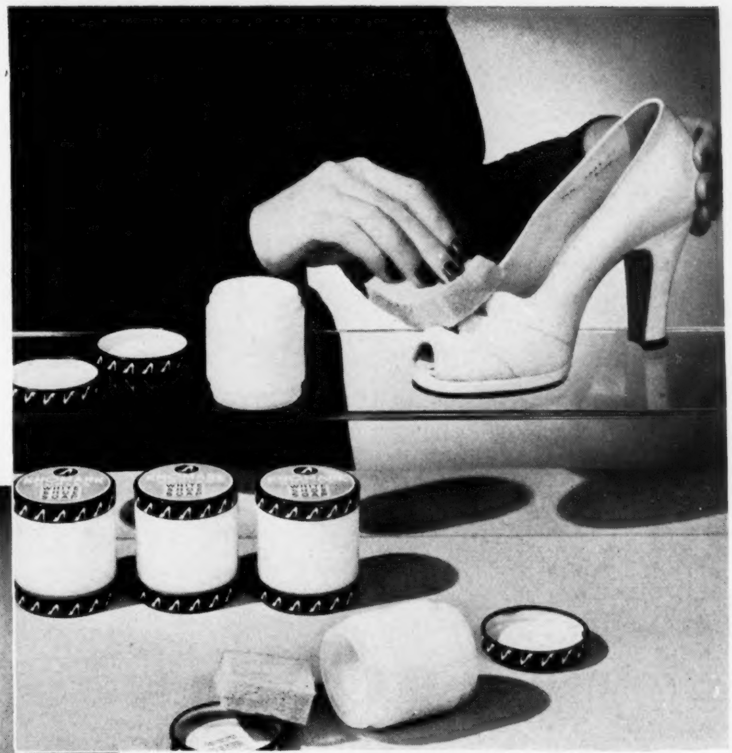
Top honors were accorded the new pastels and water color counter displays of Devoe & Raynolds, N. Y. City, in the Counter Display Group. These colorful and compact units solve a complex problem, carrying dealer incentive to stock and display the complete line of colors. Ray Hunt was the designer.

The realistic linoleum background which graces 4 sides of the Ultra Gloss No-Rubbing Floor Wax Can leaves no doubt as to the purpose of the product nor as to its success as a prize winner in the Metal Container Group.



A new type of fibre can utilizing a metal slide and a paper sanitary seal scored for Gimbels, N. Y. City, top honors in the Closure Group. Prize-winning package is part of a new private brand package recently developed by Gimbel Bros. Left, "Quixy"—an award winner in the Collapsible Tube Group. Testing more than 50 different types of packages before making a final choice, company finally selected a metal tube with nozzle and pin type closure. Tube rests in a two-part molded pulp container.





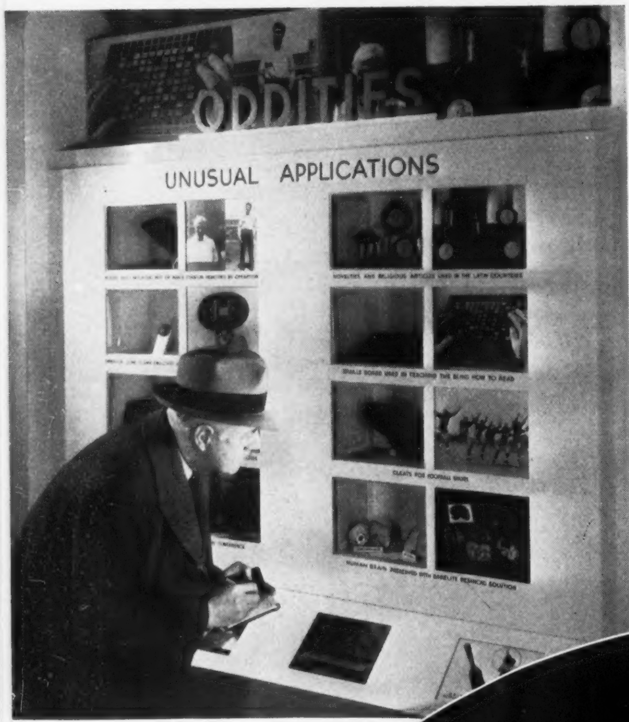
For several years past chemical specialty manufacturers have won an unusual number of prizes in the All-America Package Competition, sponsored by Modern Packaging Magazine, indicating how "container conscious" they are and how they appreciate the merchandising value of just the right package. The year 1938 was no exception and a number of special group winners are shown.

Knomark's revolutionary duplex double utility white shoe soap jar was selected for an award in the Glass Container Group. Designed for quick and convenient use by Sam and Albert Abrams of the Knomark Mfg. Co., Brooklyn, the duplex jar utilizes two closures. The top one protects the shoe soap; the bottom one reveals a blown-in compartment housing a du Pont cellulose sponge. This bottom closure is designed to be used as a water dish when cleaning shoes and also serves to keep the sponge moist.

Chrysler Corporation's Iso-Hydraulic Brake Fluid cans were awarded one of 3 equal prizes given in the Metal Container Group. The product is marketed in pint, quart, gallon and 5-gallon containers. Each has the same color motif in red and gray, with the exception of the largest, which has an all-over red top. The phrase "Iso Engineered" runs dramatically across a caliper pictured in the upper field of red.

Merck repeats competition success with acid-resistant closure. A winner in the Closure group, it was previously selected for second award in the Scientific Group of the 3rd Annual Modern Plastics Competition, conducted by Modern Plastics Magazine several months past.

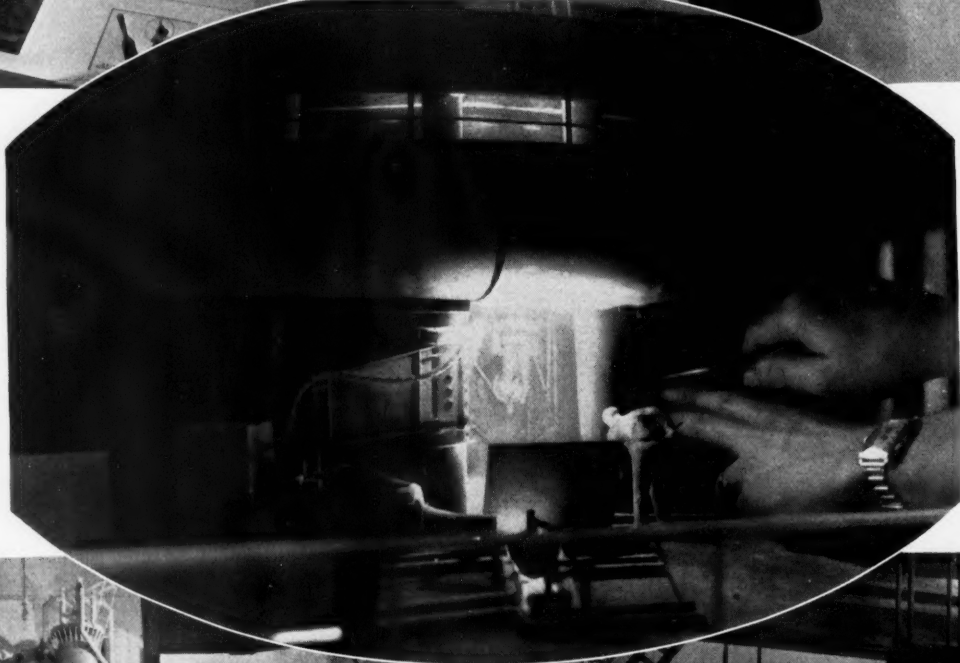
The Heavy Duty Multiwall paper bag has been used almost exclusively as a bulk container for those commodities that are dry, powdered or granular and which could be mechanically flowed or spout-poured into the container. Hence the significance of the award to the Rosa Co., Homerville, Ga., in the Shipping Container Group for using these bags for packing 100 lbs. of rosin, which is poured into the sewn open mouth bag in a liquid state at astonishingly high temperatures.



Come to the Fair

With the official opening of the N. Y. World's Fair less than 60 days away, the exhibits are now fast taking final shape. Again a page is devoted to presenting unusual "Previews." As World's Fair visitors move from one to another of the dramatized booths and demonstrations in the Bakelite exhibit they will discover that without plastic materials many of the operations of every-day life would not function. Here, the public will become aware that people eat, drink, groom and dress themselves, decorate their homes, play games, drive cars, listen to their radios—all in some measure by the grace of the plastics industry.

"Vest-Pocket" Story



of Steelmaki

Animated dioramas in the United States Steel dome-shaped World's Fair Building will dramatically illustrate the major phases of steelmaking, will make clear at a glance the complex problem of converting a 150-ton batch of steel into finished products while retaining the exacting chemical composition demanded by present-day needs. Pictures above show the studios of the Marchand Diorama Studios in Mt. Vernon, N. Y., a veritable model makers' paradise.

VICTOR Chemicals
PHOSPHORATED OILS
PHOSPHORATED CASTOR OIL
A viscous oil containing approximately 13% P_2O_5. It is used chiefly in the form of its salts.
Sodium Salt
Properties—A clear, yellow, viscous liquid containing approximately 5% combined P_2O_5; has a melting point below 50°F.; iodine value 129; oxidized fatty acids 40%; total fatty oil 60%.
Uses—For fat liquoring leather. It is run in the drum for fifteen minutes after the pH has been brought to 3.5 with sulphuric acid.
Ammonium Salt
The ammonium salt of phosphorated castor oil is of interest as a fireproofed oil which may be used to impregnate air filters. A series of oils phosphorated to different degrees and having different flash points can be supplied. Other suggested uses: As an assistant in dyeing and printing textiles.
PHOSPHORATED COD OIL
A viscous, oily liquid not readily soluble in water.
Sodium Salt
Properties—Sparingly soluble in water but disperses easily when mixed with an equal quantity of sulphonated cod oil. Melting point 77°F.; iodine value 137; combined P_2O_5 9.5%; total fatty oil 60%.
Uses—As a fat liquor it is acidified with sulphuric acid to pH 3.5 and run for fifteen minutes.
Experimental samples on request. Our sales department will be happy to send you a copy of our latest chemical catalog.
VICTOR CHEMICAL WORKS
3002 Board of Trade Building
Chicago, Ill.
VICTOR CHEMICALS
Phosphoric Acid
Pyrophosphoric Acid
Polyphosphoric Acid
Metaphosphoric Acid
Phosphorus
Phosphoric Anhydride
Phosphorous Acid
Alkylphosphoric Acids
Ammonium Imido Diphosphoric Acid
Ammonium Phosphates
Alkyl Ammonium Phosphates
Fireproofing Compounds
Calcium Phosphates
Magnesium Phosphates
Potassium Phosphates
Sodium Phosphates
Sodium Pyrophosphates
Potassium Pyrophosphate
Sodium Metaphosphate
Alkyl Acid Pyrophosphates
Formic Acid
Aluminum Formate
Nickel Formate
Sodium Formate
Sodium Boroformate
Oxalic Acid
Calcium Oxalate
Sodium Oxalate
Magnesium Sulphate
Sodium Aluminum Sulphate
Tuff-Lite
Ferrophosphorus
Triple Superphosphate

Plant Operation and Management

A digest of new methods and plant equipment

Hydrogenation of Coal

A review of the latest research developments at the experimental plant of the Bureau of Mines

By Arno C. Fieldner*

THE Annual Report of Research and Technologic Work on Coal for 1938 (Information Circular 7052), published by the U. S. Department of the Interior, Bureau of Mines, contains a brief résumé of the Bureau's work in the past year on coal hydrogenation and a complete description of the plant as of June 1, 1938. For convenience of description, the experimental plant may be divided into two parts, namely, the hydrogen-production plant and the coal-liquefaction plant.

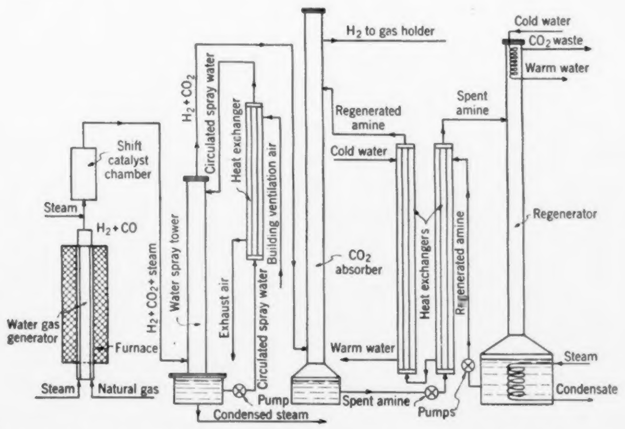


Figure 1. Schematic flow diagram, hydrogen-production unit, Bureau of Mines, Experimental Coal Hydrogenation Plant, Pittsburgh, Pa.

Figure 1 shows a flow diagram of the hydrogen-production unit. Pittsburgh natural gas containing about 90 per cent. methane, 8 per cent. ethane, 0.5 per cent. higher hydrocarbons, and 1.5 per cent. nitrogen, is mixed with about 1.5 times its volume of steam. This mixture enters the water-gas generator, where the temperature is 900° to 1,050° C. (1,650°-1,920° F.). The following reactions occur:

$$CH_4 + H_2O \longrightarrow CO + 3H_2$$
$$C_2H_6 + 2H_2O \longrightarrow 2CO + 5H_2$$

The water gas generator consists of two concentric tubes of ¼-inch wall, 7 and 4½ inches outside diameter, and 60 inches long, made of high chromium-nickel alloy (25 per cent. chromium, 20 per cent. nickel). The 1-inch annulus between these tubes is filled with pure nickel stampings, ¼ by ⅛ inch, which serve as catalyst for the reaction between the steam and natural gas. Owing to the highly endothermic character of the reactions, it is necessary to have fairly rapid heat transfer. For this reason, heat is supplied from two sources, namely, a 1.5-inch Glowbar unit in the center of the inner tube and a high-temperature resistance heater surrounding the outer tube. About 100 cubic feet of natural gas and 150 cubic feet of steam per hour are passed through the water-gas generator. The water gas produced contains about 75 per cent. hydrogen, 21 per cent. carbon monoxide, 1 per cent. carbon dioxide, and 1 per cent. nitrogen plus methane.

Immediately after its exit from the generator, the water gas is mixed with enough steam to drop its temperature to about 300° C. (570° F.). The resulting mixture of gases is passed into the water gas shift chamber. The latter consists of a 24-inch section of 6-inch steel pipe containing at its center a 2-inch copper rod. Attached to the latter are eight copper plates or vanes, which divide the chamber into eight catalyst spaces. This arrangement permits rapid heat conduction and avoids excessive channeling of the water gas-steam mixture. Rapid heat dissipation is necessary because the water-gas shift reaction is exothermic:

$$CO + H_2O \longrightarrow CO_2 + H_2 + 10 \text{ kg-cals.}$$

A copper-cobalt catalyst was used for accelerating the water-gas reaction. Approximately five parts of steam are mixed with the water gas as it issues from the water-gas generator. The exact amount of steam added is determined by the desired temperature gradient in the column of copper-cobalt catalyst. This gradient is preferably kept below 50° C. (90° F.)—that is, a catalyst temperature of 300° to 350° C. (572° to 662° F.). The catalyst is very sensitive to sulfur poisoning, but the sulfur content of Pittsburgh natural gas is apparently low enough to make purification unnecessary.

After passage through the copper-cobalt catalyst, the gas mixture contains less than 0.2 per cent. carbon monoxide, the bulk of the carbon monoxide originally present in the water gas having been converted to carbon dioxide. The excess of steam in the gases coming from the copper-cobalt catalyst is condensed by means of a water spray. The water used for this spray is cooled in "Airofin" heat exchangers, the building ventilation air (10,000 cubic feet per minute) being used as the cooling fluid. The spray tower is 8 inches by 8 feet, with a reservoir 24 by 12 inches attached to its base.

Carbon dioxide is removed in an 8-inch by 17-foot tower packed with ¼-inch carbon Raschig rings, over which a 10 per cent. tetramine solution flows. A 24- by 12-inch reservoir is

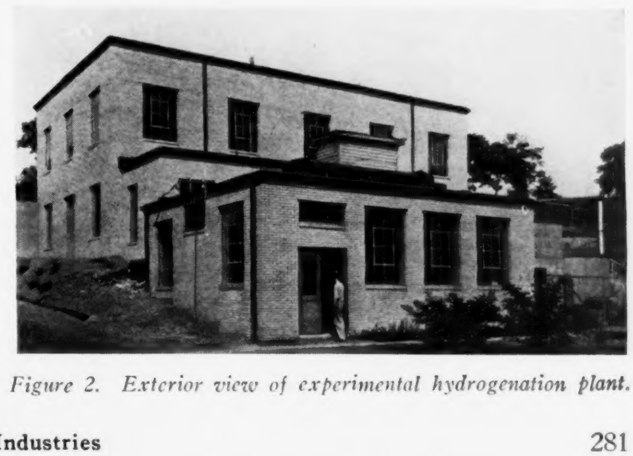


Figure 2. Exterior view of experimental hydrogenation plant.

* Chief, Technologic Branch, and Chief Engineer, Coal Division, Bureau of Mines, Washington, D. C.

attached to the base of this tower. Tetramine is mainly a mixture of diethylenetriamine and triethylenetetramine. The amine solution is regenerated by boiling and fractionating in a column packed with ¼-inch carbon Raschig rings. The boiler is 36 by 24 inches and the column 8 inches by 13 feet.

A photograph of the exterior of the coal-hydrogenation laboratories is shown in figure 2. The carbon dioxide-free hydrogen is collected in the 500-cubic foot gas holder, which may be seen at the extreme right of figure 2. A view of the hydrogen-plant interior is shown in figure 3. To the left is the water-gas generator with the water-gas shift chamber immediately above it. To the right in the foreground is the amine regenerator and behind it is the carbon dioxide absorption tower. Along the back wall of the plant is the amine heat exchanger, and immediately in front of this are the flowmeters for measuring gas, steam, amine, and water flow rates. The amine pumps may be observed under the amine regenerator and the carbon dioxide absorption towers. The water-spray tower is not visible, being immediately behind the water-gas generator.

The 400 to 500 cubic feet per hour of hydrogen produced by the plant described above contains about 0.2 per cent. carbon monoxide, 1.5 per cent. nitrogen plus methane, 0.1 per cent. carbon dioxide, 0.2 per cent. oxygen, and 98 per cent. hydrogen. It is compressed to about 1,800 pounds and stored in steel cylinders at this pressure until used in the coal-hydrogenation plant. The hydrogen plant has functioned very satisfactorily during a total production of about 60,000 cubic feet of hydrogen. At the end of this period cracks developed in the outer tube at the level of the top weld of the water-gas generator. Upon investigation, it was found that the alloy steel used in this weld had a much higher expansion coefficient than the material of which the tubes were constructed. The metal of the outer tube below the welded region showed no signs of rupture.

Figure 4 is a flow diagram of the coal-liquefaction plant. Coal is ground in a ball mill after being mixed with an equal weight of heavy oil, 0.25 per cent. of tin sulfide, and 0.25 per cent. of molybdic oxide, until most of the solid particles will pass through a 200-mesh sieve. The coal-oil paste is delivered under several pounds pressure by a gear-type oil pump to the high-pressure paste pump. The latter is a vertical piston pump with steel-ball check valves and adjustable stroke.

The paste is forced into the converter, which is a tube, 5 inches outside diameter and 3 inches inside diameter, made of 18 per cent. chromium and 8 per cent. nickel-alloy steel.

Coal-oil (equal parts by weight) paste is pumped into the converter at the rate of 5 to 10 pounds per hour, the rate depending upon the reaction temperature, which is usually between 420° and 450° C. (788° and 842° F.). Hydrogen is pumped in at the rate of about 100 cubic feet (measured at atmospheric pressure and temperature) per hour. The excess hydrogen over that absorbed by the coal is recirculated by the high-pressure recirculation pump.

The heavy oil overflows into the standpipe inside the converter and is discharged through a specially designed valve.

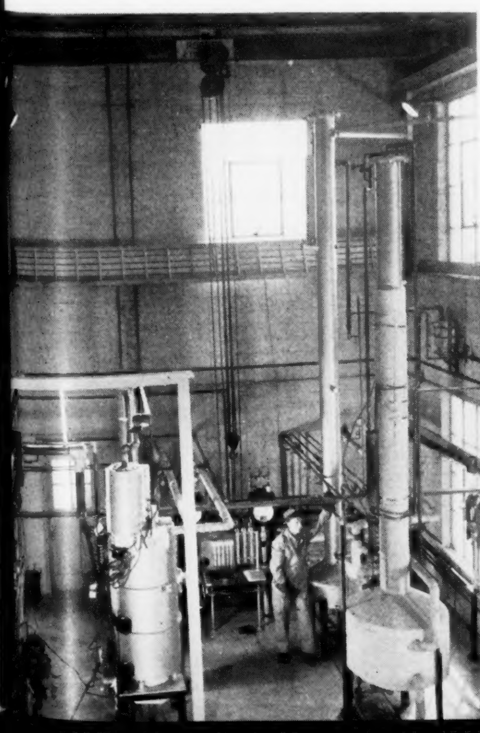
The heavy oil discharge consists of a slurry of a material resembling a primary coal tar with the ash of the coal and unreacted coal particles suspended in it. To facilitate discharge, all the valves and discharge pipes are heated by steam jackets to about 100° C. (212° F.). This slurry is diluted with about 30 per cent. of its volume of a middle oil obtained by fractional distillation of the converter overhead oils and is then centrifuged. The centrifuged oil is used to provide the vehicle for producing the mixture of coal and oil at the head of the process.

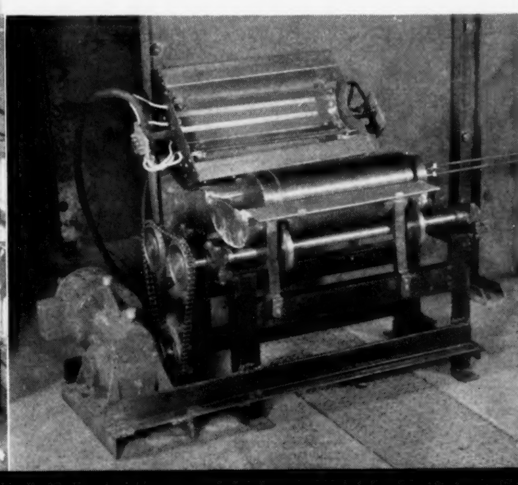
The oil vapors carried through the top of the converter by the unreacted hydrogen gas consist of about 20 per cent. of light oil boiling below 200° C. and 80 per cent. of a middle oil boiling up to 330° C. This overhead oil plus hydrogen is passed through a water-cooled condenser and then into one of the traps shown in figure 5. The hydrogen gas is scrubbed by passage over solid caustic soda in the second trap of figure 5 to remove hydrogen sulfide before the gas is admitted to the recirculation pump. The recirculation gas contains about 10 per cent. of hydrocarbons, the proportion of these being controlled by the rate of gas purging.

Hydrogenation Assay of Bruceton Coal

During the year quantitative procedures for the hydrogenation assay of American coals have been developed. This work involved the perfection of mechanical equipment for continuous operation of the experimental plant, the training of operators for each of the three shifts, and the development of feasible quantitative tests. All of the work was done on Pittsburgh bed coal from the Bureau's experimental mine at Bruceton, Pa.

The assay consists in determining the optimum conditions in liquid-phase hydrogenation for the maximum yield of a "middle" oil consistent with the complete regeneration of the vehicle used in making a paste with the original coal. For Bruceton coal, the optimum conditions are approximately 440° C., 200 to 300 atmospheres pressure, 1.75 hours contact time, and a circulation time of about 100 cubic feet (measured at atmospheric pressure) per hour of hydrogen. Under these conditions, a yield of about 73 per cent. of "middle" oil containing 20 per cent. boiling in the gasoline range and 80 per cent. boiling below 330° C. (626° F.) and 12 to 15 per cent. of hydrocarbon gases (methane to butane) is obtained in a single pass through the converter. The 12 to 15 per cent. loss consists of 6 to 8 per





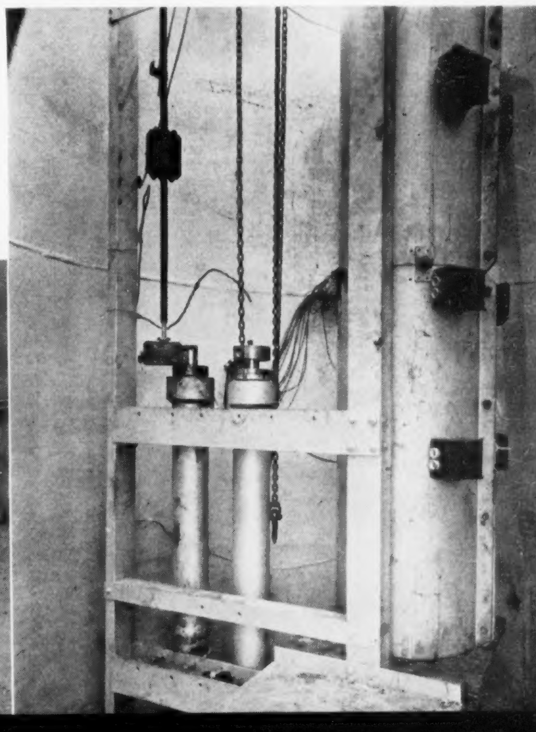


Figure 3, left, interior view of experimental hydrogen-production unit. Figure 6, center, apparatus used in small bomb hydrogenation tests. Figure 5, right, trap for receiving cooled overhead oil and hydrogen caustic scrubber for hydrogen.

cent. of unreacted carbonaceous material and 6 to 7 per cent. of oxygen, nitrogen, and sulfur hydrogenated to water, ammonia, and hydrogen sulfide, respectively. The "middle" oil contains 15 to 18 per cent. of tar acids and 3 to 5 per cent. of tar bases, and the remaining neutral oil consists of 6 to 8 per cent. olefins, 67 to 70 per cent. aromatics, and 22 to 27 per cent. saturated hydrocarbons.

Because Bruceton coal is to be used as a standard coal, much more work was done with it than is planned for other coals. Future experience will suggest additional detailed investigations upon, or the development of new hydrogenation procedures for, this coal.

Small-Bomb Experiments

Rates of liquefaction and of removal of oxygen, nitrogen, and sulfur.—Figure 6 is a photograph of the apparatus used in small-bomb hydrogenation studies. Hydrogenation in tetrahydronaphthalene was carried out for different lengths of time (3, 6, 9, and 12 hours) at 385°, 400°, and 415° C. Sixty per cent. of the oxygen was removed in the first 3-hour period; the remaining 40 per cent. was eliminated with much greater difficulty. These results indicate that at least two types of oxygen linkage are present in coal. Nitrogen removal was slow and approximately constant. Sulfur removal was also slow and occurred to the greatest extent in the first 3 hours.

In connection with this work, a procedure was developed for determining the sulfide, sulfate, pyritic, and organic forms of sulfur in the insoluble residues from hydrogenated coal. The analytical data permit the trend of changes in the relative proportions of forms of sulfur to be followed with increased time of hydrogenation.

Tentative conclusions from the small-bomb experiments are that primary liquefaction, especially in the early stages, is characterized by the elimination of coal oxygen, principally as water, and by a decrease in molecular weight of the coal substance, which, after liquefaction, is recovered as a colloidal solution in the vehicle. Although elimination of oxygen and lowering of molecular weight usually occur simultaneously, they appear to be largely independent.

Activation energies of 55 and 32 kg-cal. calculated for the fast and slow oxygen removal, respectively, indicate that the fast reaction is probably a homogeneous liquid-phase hydrogenation reaction of a non-catalytic nature, whereas the slow reaction is probably a heterogeneous hydrogenation reaction involving contact with a surface loaded with activatedly adsorbed hydrogen.

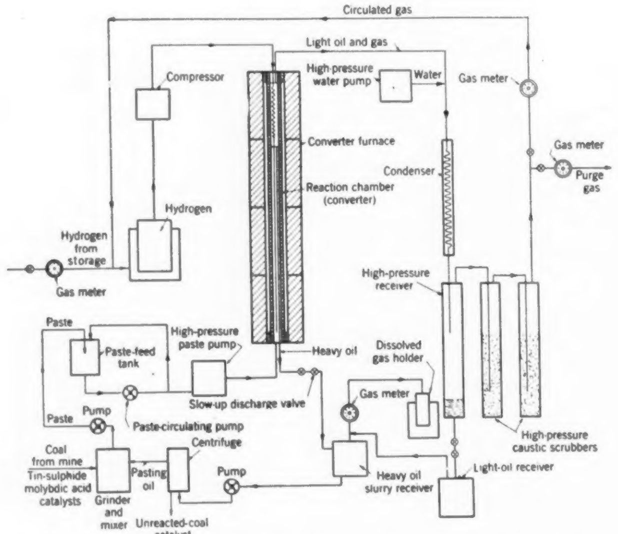


Figure 4. Schematic flow diagram, Bureau of Mines Experimental Plant, Pittsburgh, Pa.

Further data have been obtained recently on the rate of primary liquefaction of Bruceton coal at various temperatures from 310° to 445° C. These data are given in table 1, with some data from earlier work. An inspection of this table shows that the temperature coefficient of the primary liquefaction (yield of gas plus benzene soluble) varies with the temperature, becoming negative after about 440° C. for 6 hours. If one considers only the yield of benzene-soluble material, the temperature coefficient becomes negative at about 425° C. for 3 and 6 hours contact time and at about 410°C. for 9, 12 and 15 hours. The optimum temperature for the primary liquefaction of Bruceton coal is therefore about 425° C. for contact times less than 6 hours. It is interesting to note that this temperature is 15° C. lower than the optimum found in the experimental plant for continuous hydrogenation. The difference between these observations may be due to the differences in pressure of hydrogen in the two instances, that for the small bomb tests being 500 to 700 pounds lower than that for the experimental plant. The temperature coefficient of the gas yields remains positive at all temperatures.

The maximum temperature coefficient for the yield of benzene-soluble material of table 1 is 1.8 for the 370° to 385° C. interval for 3 hours contact time. This corresponds to an activation energy of 33 kg-cal. It may be significant that this value is almost identical with that obtained for the rate of removal of the last 40 per cent. of oxygen from the coal under similar conditions. It may be, therefore, that the limiting slow reaction in the liquid-phase hydrogenation of coal is the catalytic hydrogenation of the fragments resulting from the dissociation of the coal substance at an oxygen bond.

TABLE 1.—Data for temperature coefficients of primary liquefaction (B.S. = benzene solubles)[1]

Temp.		Contact times, hours					
° C.	Product	1	3	6	9	12	15
310	Gas	..	0.9	..	2.1	..	..
310	Gas + B. S.	..	21.0	..	22.0	..	.
340	Gas + B. S.	..	..	..	48.8	..	..
355	Gas	..	1.0	..	2.7	..	..
355	Gas + B. S.	..	33.1	..	81.6	..	..
370	Gas	..	1.7	2.8	4.3	5.3	..
370	Gas + B. S.	..	45.5	71.0	90.0	89.2	..
385	Gas	..	3.5	6.0	7.6	9.5	10.7
385	Gas + B. S.	..	82.2	90.4	91.8	93.8	92.0
400	Gas	2.8	5.5	7.5	9.9	12.3	14.0
400	Gas + B. S.	72.8	90.3	93.0	94.5	95.1	93.1
415	Gas	..	6.9	11.4	15.7	17.9	20.0
415	Gas + B. S.	..	91.7	94.3	95.0	94.6	93.3
430	Gas	..	8.6	13.6	..	..	..
430	Gas + B. S.	..	91.9	92.6	..	..	..
445	Gas	..	18.6	..	..	..	..
445	Gas + B. S.	..	84.0	..	..	..	..

[1] Average pressure was 2,700 pounds in these tests.

Hydrogenation of Banded Constituents

A series of small-bomb experiments was made out to determine the relative ease of hydrogenation of the various banded constituents of bituminous coals of different ranks and types. The purity of these bands was first determined by microscopic examination of thin sections. Of the seven fusains thus far hydrogenated, appreciable liquefaction was effected in all instances; two samples were liquefied to the extent of about 25 per cent.

Similar studies on opaque attritus material showed yields between 40 and 85 per cent. and on translucent attritus and anthraxylon yields up to virtually 100 per cent. In all cases these yields can be predicted approximately from the ordinary proximate and ultimate analyses combined with the petrographic analyses of the coal band. The relation between volatile matter and hydrogen-carbon ratio of coal and its banded constituents and its usefulness in predicting hydrogenation yields have been expressed in curves approximated by straight lines. Depending on the units used in the co-ordinates, different yet fairly definite groupings of the banded constituents may be obtained.

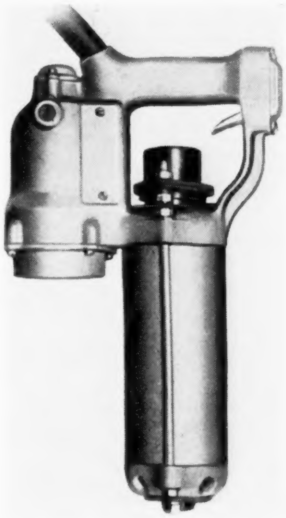
New Equipment

Spray Machine

A machine for the semi-automatic spray coating of the inside of small cylindrical objects such as paper or metal cans is a new development of Eclipse Air Brush Co., 390 Park Ave., Newark, N. J. The cylinders feed by gravity down an adjustable slide and are released by a manually operated lever onto a rotating device. A solenoid operated spray gun fitted with an extension nozzle is then moved forward to coat the inside, while the cylinder is being rotated. The gun is pulled back and the next cylinder comes down, pushing the finished one on its way. An average production of 10,000 pieces per 8-hour day can easily be maintained with machine, according to manufacturer.

Super Power 2" Electric Hammer

A powerful electric hammer built for operation on the ordinary 110 volt A. C. lighting circuit will be known to the trade as No. 25 Hammer. Manufacturer, Syntron Co., 420 Lexington Ave., Homer City, Pa., designed it primarily for heavy construction drilling and cutting, and for large plant maintenance work, and claims the following features: Using star drills in this hammer, holes up to 2" in diameter can be drilled in the hardest concrete. Using stone points or cold chisels, the hammer will cut holes through masonry floors and walls for risers, doors, windows, etc. It will drive up to ¼" cold rivets. The hammer uses the regular, patented construction of all Syntron hammers, being made up of two magnets wound around a barrel in which is a free moving, heavy piston, that strikes directly on the shank of the tool being used. The incorporation of a small, high speed blower motor in the handle, that keeps the magnet windings cool, has resulted in a hammer weighing only 25 pounds. It is 16" overall, and 3½" in diameter.



Single Stroke Lift Truck

A lift truck which will raise capacity loads with a single stroke and requiring less than 70 pounds effort on the handle, is a recent development of Service Caster & Truck Co., Albion, Mich. Complete handle-to-the-side lift permits operation of the handle from any spot within a horizontal arc of 180°. Truck is mechanical in lifting, hydraulic in lowering.

Thermostatic Control for Moisture Teller

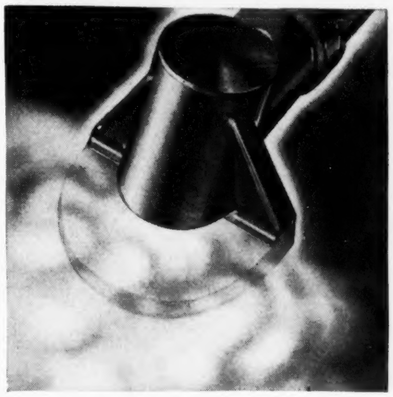
An adjustable thermostatic control is available for the Moisture Teller manufactured by Harry W. Dietert Co., 9330 Roselawn Ave., Detroit, Mich. Thermostat automatically controls drying temperature at any given temperature between 135 and 250° F., a desirable feature for drying samples of materials that are sensitive to temperature at which they are dried. Control materially increases range of materials for which the moisture teller may be used to rapidly determine the exact moisture content.

New Inhalator Model

An inhalator with improvements that greatly increase its use for treating cases of gas poisoning is announced by Davis Emergency Equipment Co., 55 Van Dam St., New York City. Improved model can be used with compressed oxygen tanks of three different capacities without need of special adaptors, thus adapting it for treating different kinds of cases. For ordinary emergency work, two 16 cu. ft. cylinders containing a mixture of oxygen and carbon dioxide are carried in the inhalator case, ready for immediate use. If an additional supply is needed, a 50 cu. ft. tank can be connected directly to the pressure-reducing value of the instrument. The pressure-reducing valve and the pressure gauges used in this inhalator are approved by the Underwriters' Laboratories.

C-O-Two Baffle Type Nozzle

New and improved C-O-Two baffle type nozzles, providing a non-turbulent distribution of gas from C-O-Two carbon dioxide fire extinguishing systems are announced by the C-O-Two Fire Equipment Co., 560 Belmont Ave., Newark, N. J. These nozzles reduce the velocity and pressure of the discharge and permit rapid expansion and non-violent penetration of the gas throughout the entire protected area. They are compact and do not require a protruding horn or metal enclosure which might become damaged or knocked off.



Wide Angle Spray Nozzle

A non-clogging spray nozzle, for use in air conditioning, air washers, air coolers, brine spraying, chemical processes or wherever an exceptionally wide spray angle is required, has been placed on the market by Spraying Systems Co., 4922 W. Grand Ave., Chicago, Ill. "Parasol" nozzles are of sturdy construction, accurately machined and are available with female pipe construction, ⅛ in. to ½ in. Capacities range from 0.5 to 4.0 G. P. M. at 10 pounds pressure.

pH Slide Comparator

For colorimetric determination of pH, chlorine and phosphates, a new slide comparator, embodying radical changes in design, has been developed by W. A. Taylor & Co., 872 Linden Ave., Balto., Md. Outfit is molded entirely from plastic, thereby considerably reducing weight. All pH, chlorine and phosphate values, as well as the indicator names, are engraved in white directly on the plastic slides. Improved catches are used to hold the top on the base and all metal parts are rustproof. The whole outfit, including the slide, is 10 in. long, 2⅛ in. wide and 4 in. high and weighs only 1½ lbs. New comparator consists of a slide and a base. Each slide contains 9 color standards alternating with ampoules of distilled water; all standards guaranteed to maintain their accuracy for five years. Base contains two vials of indicator solution, with 0.5cc pipettes, 5-5cc test tubes, and a piece of etched glass in a special compartment. Determinations are made by filling three of the test tubes with the test sample, adding 0.5cc of indicator solution to the middle one, placing the slide on the base and moving it back and forth until the test sample matches one of the color standards. The pH, chlorine or phosphate value is then read off directly from the values on the slide.

Booklets & Catalogs

How to get these booklets: Companies will be glad to supply copies free, provided "Chemical Industries" is mentioned and the request is made on company stationery. Your business title should also be given.

Abbe Rotary Cutters, Bulletin No. 45, on line available for chemical, drug, plastics, paper, leather, rubber and allied industries, stresses features, method of operation, specifications, and illustrates various adaptations and models. Abbe Engineering Co., 50 Church st., New York City.

Accelerated Salt, Bulletin, describes new cyanide mixture of uniform composition for production of mixed carbon-nitrogen cases on plain carbon and alloy carburizing steels; claimed to save 40% of the time in production of shallow cases. R. & H. Chemicals Dept. of E. I. du Pont de Nemours & Co., Wilmington, Del.

Air and Gas Compressors, Bulletin A-18, on Class WN-112, describes and illustrates variety of industrial installations made since this compressor was announced in 1937; feature construction details illustrated in a clear, simple manner. Sullivan Machinery Co., Michigan City, Ind.

Air-Operated Control Valves, for controllers of the pneumatic type, Bulletin No. 514, outlines principles of design of various types and gives outstanding features; directions for ordering or specifying valves are included. Bristol Co., Waterbury, Conn.

Ajax-Northrup Furnaces, Brochure, points out what split-second heating can do in the production line, outlines results obtained in some of the largest industrial laboratories and later reproduced in volume production in large industrial plants. Ajax Electrothermic Corp., Trenton, N. J.

Aluminum News-Letter, January, 1939, feature "In the Brewery it's Aluminum . . . All the Way." Aluminum Co. of America, Pittsburgh, Pa.

Annealing and Hardening with SC Atmosphere Furnaces, Folder, operating data, illustrations of typical installations, and short discussion on savings and improved physical properties reported by manufacturers using these furnaces. Surface Combustion Corp., Toledo, O.

Cadalyte "38," Manual, gives recommended methods of preparing, controlling, and analyzing the solution. R. & H. Chemicals Dept. of E. I. du Pont de Nemours & Co., Wilmington, Del.

Carbonate Remover, Booklet, discusses effect of carbonate on cyanide plating solutions, the determination of carbonate and its removal. R. & H. Chemicals Dept. of E. I. du Pont de Nemours & Co., Wilmington, Del.

Carburizing Salt, Technical Service Bulletin, describes new development—du Pont Carburizing Salt—for economical production of deep high-carbon cases on plain carbon and alloy carburizing steels. R. & H. Chemicals Dept. of E. I. du Pont de Nemours & Co., Wilmington, Del.

Carnaqua Waxes, Booklet, describes new group of waxes similar in character to carnauba wax; gives procedure for emulsification, a suggested formula, and graphically describes a practical method for testing gloss, durability and waterproofness of emulsions made with these waxes; lists prices also. Beacon Co., 89 Bickford st., Boston, Mass.

Chemical Coating, Bulletin, describes and illustrates use of a chemical coating called Granodine to rustproof iron and steel parts by dipping or spraying before painting. American Chemical Paint Co., Ambler, Pa.

Chemistry and You, Vol. 16, No. 1, notes on chemistry with economical advice from a busy laboratory. Arthur R. Maas Chemical Labs., 308 E. 8 st., Los Angeles, Calif.

Combination Linestarter, Pamphlet No. B. 2131, stresses low installation and operating costs, compactness, and safety of Westinghouse line, combining the "De-ion" linestarter and the Nofuze "De-ion" circuit breaker. Westinghouse Electric & Mfg Co., East Pittsburgh, Pa.

Electroplating Chemicals, Booklet, treats in brief form the chemicals, processes and materials of interest to electroplaters, and describes each, outlining part it plays in efficient, economical plating. R. & H. Chemicals Dept. of E. I. du Pont de Nemours & Co., Wilmington, Del.

Electrotinning, Manual, brings up to date recommended practices for the operation of Sodium Stannate-Acetate Electrotinning process; gives standard methods of preparing, controlling and analyzing solution. R. & H. Chemicals Dept. of E. I. du Pont de Nemours & Co., Wilmington, Del.

Engineering Properties of Nickel, Technical Bulletin T-15, extensive data on mechanical properties and physical constants of nickel; short section is devoted to description of mill products, including available sizes and forms, and a discussion of tempers, surface qualities and standard sizes. International Nickel Co., 67 Wall st., New York City.

Filling Machines, Brochure, on S & S line, stresses outstanding features; illustrations of various applications. Stokes & Smith Co., 4926 Summerdale ave., Phila., Pa.

Gear Motor Speed Reducers, for efficient low-speed operation, leaflet 2203-B, presents numerous line drawings and installation photographs, including table of ratings and speeds with 1750 rpm motors. Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Geared Drives for all Industries, Booklet A-68191, explains uses, adaptations and developments of all types of geared drives, with special emphasis on the quarry, textile, pulp and paper, coal, steel and petroleum industries; profusely illustrated. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

High Temperature Application of Nitrocellulose Lacquers, Reprint of paper by Henry H. Nelson from "I. & E. C.", discusses work done on high temperature lacquers by Sharples Solvents Corp. and presents facts in form which will be of interest to industry. Sharples Solvents Corp., 23rd & Westmoreland sts., Phila., Pa.

H-O-H Lighthouse, February, 1939, first of a new series of the "Lighthouse", contains short résumé on water conditioning. D. W. Haering & Co., 3408 Monroe st., Chicago, Ill.

How to Handle It With Rex Coal and Ash Handling Equipment, Bulletin 331, general information accompanied by many pictures of present Rex installations together with drawings of typical uses of Rex power plant equipment. Chain Belt Co., Milwaukee, Wis.

Indicators for Thermocouple Temperatures, Catalog N-33A(5), describes new switchboard-model temperature indicator with self-contained toggle-type switches for connecting any one of a number of couples to the measuring circuit, illustrated. Leeds & Northrup Co., 4901 Stenton ave., Philadelphia, Pa.

Micarta, Booklet B. 2156, of interest to paper mill executives, on the subject of cutting costly delays in paper making through use of Micarta; various applications explained, together with physical properties. Micarta Division, Westinghouse Electric & Mfg. Co., Trafford, Pa.

Neoprene Notebook, January, 1939, feature "Neoprene and Rubber Compounds Absorb Varying Amounts of Water." Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Wilmington, Del.

New and Better Fittings for Small Welded Lines, Circular No. 309, serves to introduce new product in this line, graphically portraying product and its uses with photographs and drawings; tables show hydrostatic bursting pressures, tensile pull tests and working pressures. Crane Co., 836 So. Michigan ave., Chicago, Ill.

Nickel Steel Topics, February, 1939, brings user and producer of nickel alloy steels to date on latest developments in this field. International Nickel Co., 67 Wall st., New York City.

Organic Chemicals Manufactured by Shell Chemical Co., Booklet, presents in a clear and concise manner specifications and properties of the organic chemicals manufactured on a commercial scale by Shell; brief discussions of the most important applications are included. Shell Chemical Co., Shell Building, San Francisco, Calif.

Oxy-Acetylene Tips, February, 1939, feature "How the Oxy-Acetylene Process Simplifies Steel Production," a pictorial review of how one steel mill uses this process in production of steel and in fabrication and maintenance of steel mill equipment. Linde Air Products Co., 30 East 42 st., New York City.

Pneumix Air-motored Agitators, Folder, presents data on performance of these agitators in laboratories and industrial plants; illustrated. Eclipse Air Brush Co., Pneumix Division, Newark, N. J.

Portable Mixers, Bulletin, describes, illustrates and gives specifications on extensive line of motored portable mixers and parts, methods of using mixers are illustrated and described. Mixing Equipment Co., Rochester, N. Y.

Potentiometer Controllers, Bulletin 202-2, describes automatic temperature controllers for industrial temperatures in making iron and steel, glass, ceramics, chemicals, etc.; profusely illustrated with pictures of adaptations and working charts. Foxboro Co., Foxboro, Mass.

Price List, Mallinckrodt Chemicals, February, 1939, Mallinckrodt Chemical Works, St. Louis, Mo.

Price List, of medicinal, analytical, technical and photographic chemicals, February, 1939. Merck & Co., Rahway, N. J.

Price List, January, 1939, of exceptional interest to chemists, experimenters and manufacturers of cosmetics, pharmaceuticals, soap, etc., in that it makes available many materials in small lots and quotations are given from smallest packages to unit ones. R. F. Revson Co., 97 7th ave., New York City.

Price List of whole and milled botanical drugs and insecticides, February, 1939. R. J. Prentiss & Co., 100 Gold st., New York City.

Progressive Perfumery and Cosmetics, December, 1938, feature "The Effect of Hard Water on Cosmetics." Van Dyk & Co., 57 Wilkinson ave., Jersey City, N. J.

Resistoflex PVA, Brochure, reports unusual development of flexible tubing from a synthetic resin which, because of its unusual properties, offers great possibilities for use in industry; gives highlights of uses, etc.; manufacturer invites inquiries on gaskets, sheet material and dipped goods as well as tubing (now supplied up to 1" I. D. inclusive). Resistoflex Corp., 370 Lexington ave., New York City.

Silicate P's and Q's, Vol. 19, No. 2, short résumé of part silicates share in the building, furnishing and operation of a home. Philadelphia Quartz Co., 121 S. Third st., Phila., Pa.

Single-Cam Cycle Controller, Bulletin No. 523, complete information on various features that make this instrument a flexible controller, function of each of the operating parts is explained, as well as the special arrangement for two-speed rotation of the cam. Bristol Co., Waterbury, Conn.

Speed Reducers, Descriptive Data 3620, extensively describes and illustrates Westinghouse Types SH and DH speed reducers, for use with all prime movers such as electric motors and gas, oil or diesel engines, and suitable for any application where economy of power and exact speed reduction are important. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Stokers for Bituminous Requirements, Booklet B. 2170, describes line of single and multiple retort stokers, designed to meet every bituminous coal burning requirement in industry. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Synchronous Motors, Booklet B-2164, outlines advantages of synchronous motors, how to select proper unit, and includes application data for various installations. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

TAG Dial-Indicating Thermometers, Catalog No. 1170, complete descriptive data, with specifications, uses, and illustrations. C. J. Tagliabue Mfg. Co., Park & Nostrand aves., Brooklyn, N. Y.

The Houghton Line, January-February, 1939, features bird's-eye view of the Houghton line of processing and maintenance products for '39. E. F. Houghton & Co., 240 W. Somerset st., Phila., Pa.

Thiokol Facts, Vol. 1, No. 17, reports unusual developments embodying use of Thiokol. Thiokol Corp., Trenton, N. J.

Tool of 1001 Uses, Catalog, on Handee precision tools for every conceivable line of business; helpful and interesting information for use in industrial practice, including specifications, sizes, prices; profusely illustrated. Chicago Wheel & Mfg. Co., 1101 W. Monroe st., Chicago, Ill.

Transmission Belting, Folder, explains two outstanding achievements in treated leather belting, presented in letter folder file style so that it can be added to useful data file. E. F. Houghton & Co., 240 W. Somerset st., Phila., Pa.

Turbine of Flexible Design, Booklet B. 2175, on Type M turbine, in the 100 to 2,000 h. p. range, made for every type of industry using mechanical and electrical power. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Wide-Strip Pyrometer Recorders and Controllers, Catalog No. 1452, describes fundamental principles of operation, also various operating units and special features of design; well illustrated. Bristol Co., Waterbury, Conn.

New Chemicals for Industry

A digest of products and processes

Use of Halogenated Hydrocarbon "Parting Liquid" In a Sink-and-Float Process

THE advantages of straight gravity separation have long been recognized by all familiar with the art of coal and mineral beneficiation. Authentic records show that ferric chloride solutions and sulfuric acid were used as heavy liquids about the middle of the last century. Since then several efforts to use heavy liquids for coal and ore dressing have been made. Application of this principle using halogenated hydrocarbon as "Parting Liquids" in a Sink-and-Float process has finally been demonstrated commercially after more than 30 years of research by du Pont interests.

The first attempt by du Pont to develop the process was based on using molten tin or antimony bromide as "Parting Liquids." Though successful in producing high-grade concentrate, the cost of the process ended that development.

It became evident that any heavy liquids that could be used as "Parting Liquids" for the beneficiation of coal and minerals should have the following general characteristics. They must be available in specific gravities of between 1.30 and 3, and have low vapor pressure with good mobility at working temperatures; low melting point; minimum miscibility with water; stability toward water, air, light and heat; freedom from the tendency to emulsify with water; approximately the same viscosity as water; and low cost.

As research proceeded it developed that minimum miscibility with water in both phases was the important requirement, as any "Parting Liquid" in which water is soluble would decrease in specific gravity with use; and any "Parting Liquid" soluble in water would increase liquid loss beyond the allowable limit.

Halogenated hydrocarbons, as represented by tetrabromethane ($C_2H_2Br_4$), pentachlorethane (C_2HCl_5), and trichlorethylene (C_2HCl_3), having specific gravities of 2.96, 1.68 and 1.46 respectively at twenty degrees C., were adopted as the standard "Parting Liquids," because they closely met the above requirements. All intermediate gravities from 1.30 to 2.96 were not available in the pure liquid, and they are manufactured by mixing the foregoing standard liquids in the proper proportion or by the addition of a suitable petroleum distillate.

Early efforts to develop a commercial process using these halogenated hydrocarbons as "Parting Liquids" were unsuccessful because of process and mechanical difficulties. The mechanical difficulties were overcome. The discovery leading to the solution of the liquid loss problem, making the process economically possible, was in two words "Active Agents," which immunize the solids against the "Parting Liquids."

Substitution of chemical processes for purely mechanical ones grows with amazing rapidity. In a paper read before the Annual Meeting of the American Institute of Mining & Metallurgical Engineers, February 13-16, 1939, Mr. W. B. Foulke, Director, Minerals Separation Division, R. & H. Chemicals Department, E. I. du Pont de Nemours & Co., discloses the details of the use of halogenated hydrocarbon in a Sink-and-Float process, first announced by the du Pont interests last May. Process offers exceptional promise in coal and ore dressing.

The foregoing is a very brief outline of the steps covered in the development of the process and apparatus described in more detail hereafter.

All pieces of apparatus containing "Parting Liquid" are vapor sealed with a U-shaped member filled with water; the cover is so constructed that not less than 6 inches of its edges rest in the water, thereby forming the seal.

There are two reasons for the water seal: (1) The escape of the "Parting Liquid" vapor must be prevented as all such liquids are volatile and the losses resulting if the apparatus is not sealed would make the process inoperable from a commercial standpoint; and (2) the toxicity of the "Parting Liquids."

They, like all halogenated hydrocarbons, are toxic if taken into the human system by inhalation, absorption through the skin or otherwise. At high temperatures they tend to decompose with the formation of other toxic compounds.

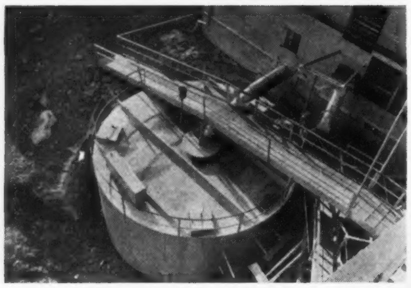
Potential health hazards involved in the operation and maintenance of the equipment are eliminated if proper precautions are taken to prevent exposure of humans to "Parting Liquids" or their vapors. This can be accomplished by—first, keeping the entire system vapor-tight to prevent escape of either vapor or liquid or removal of vapor by ventilation at point of exit. Second, by ventilating all pockets, sumps and low places to prevent the accumulation of the heavier than air "Parting Liquid" vapors. Third, by washing all surfaces to be repaired with water and kerosene. Fourth, by preventing exposure of these materials in either liquid or vapor form to high temperatures, such as occur in open flames and electric-welding arcs. Fifth, should a human come into contact with "Parting Liquid," the exposed or contact surfaces of the body should be wiped dry and immediately washed with soap and water.

The extremely minute quantity of "Parting Liquid" which may be on the material leaving the plant introduces no health hazards because it does not remain on the material. Fire hazards are nil, as the halogenated hydrocarbons are non-flammable.

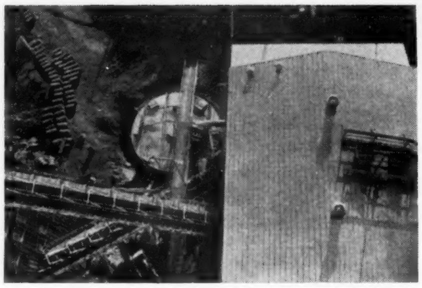
As stated previously it is necessary to place a film of "Active Agent" on each mineral particle so that the solids are immunized against the "Parting Liquids."

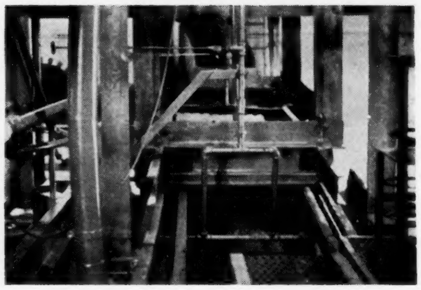
The "Active Agents" used in treating coal, for example, are starch acetate or tannic acid in concentrations of one hundredth of one per cent. This use of "Active Agents" has reduced the "Parting Liquid" loss, from a maximum of 50 pounds, to less than ten ounces per ton of material treated, thus making the process economically possible.

The wetting-out shaker consists of a solid plate wetting deck followed by a perforated plate washing deck, both suspended on hickory board hangers. These decks are reciprocated by a ball and socket cam-type drive and act as counter-balances for the preliminary sizing screen.



Above, settling tank is located close to the Sink-and-Float plant. Here the sludge is separated from the "Parting Liquids" so that these liquids can be used over again. The size of the tank shown above is approximately 25 feet in diameter and 12 feet high. Center, view of the plant, looking down upon it from the breaker.





The wetting-out deck and dewatering screen where the "Active Agent," such as tannic acid, is applied with water. If the mineral or coal comes in contact with the "Parting Liquid," it absorbs much of this liquid which would be lost. To reduce this loss, the mineral or coal is first sprayed with a dilute solution of "Active Agent."

The material passes over the decks at a rate of 75 to 80 feet per minute. Sprays are arranged to give a continuous feed of "Active Agent" solution across the wetting deck. After this treatment the material together with the "Active Agent" solution passes to the dewatering deck where the solution drains off, and the material is washed by a clear make-up water spray and is again dewatered. The underflow from the screen is delivered to the settling thickener.

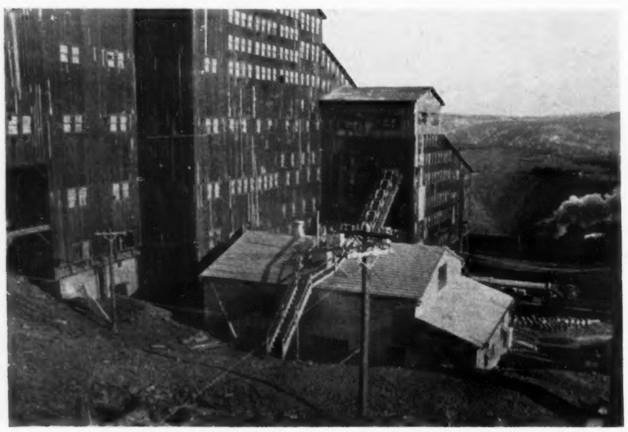
The overflow from the thickener flows to a surge tank and pump which is used for returning the "Active Agent" solution to the wetting-out shaker after it has been fortified.

After the material passes off the dewatering screen, it enters the separator which consists of a rectangular box containing a layer of "Parting Liquid" approximately 32 inches deep on which is superimposed a layer of water 24 inches deep. The two liquids are circulated concurrently through the separator at a speed of 75 to 100 feet per minute.

The material entering the separator is subjected to a horizontal classification in the water layer prior to settling onto the "Parting Liquid" water interface. A final sink-and-float classification occurs in the "Parting Liquid" layer from which three fractions are withdrawn; namely, a float, a middling, and a sink. After the final classification in the "Parting Liquid" the material is carried out of the separator by a rotary elevator.

The amount of air introduced into the separator with the feed is kept at a minimum by curtains hanging in the feed chutes. The feed chute is provided with a vapor-tight gate which is kept closed when the machine is shut down.

The "Parting Liquid" and water are circulated by axial flow propeller pumps. These pumps move the liquid through an orifice plate restriction which is followed by a grid bar construction. The liquids flow unrestricted from this point to the rotary elevator.



View of the Sink-and-Float plant, the small white building in the foreground compared with the towering bulk of the old-time coal breaker. The small plant, utilizing the Sink-and-Float process, has a capacity for coal separation equal to about one-half the capacity of the breaker.

A series of hinged plates extend a short distance below the "Parting Liquid" surface so that the float bed is agitated, releasing any small entrapped sinks.

A liquid level control maintains the level of the "Parting Liquid" within plus or minus one inch by operating by-passes on the circulating pumps. This control compensates for variation in the quantity of feed to the separator.

Washer Section

On delivery from the separator the sink, middling and float fractions together with the entrapped "Parting Liquid" and water pass to the washer section.

The purpose of the washer is to recover any "Parting Liquid" left on the material after separation, by scrubbing the fractions with recirculated water.

The washer consists of a double deck screen operating in a vapor-tight housing. The screens are suspended on hangers which extend through the housing via a water seal. The side frames of each deck are extended through the end of the housing and are fitted with vapor sealing devices. A ball and socket cam-type drive is attached to these frames. The screens are dressed with perforated plate and wedge wire.

Immediately over each deck there are five spray headers fitted with fish tail nozzles arranged so that the sprays overlap. The circulated wash water is discharged from these nozzles at eight pounds pressure. The under part of the washer housing is divided into collecting hoppers; the first to collect entrapped "Parting Liquid" discharged from the separator; the second, the water from the first spray header and the remaining, for the balance of the wash water removed from the product.

When the products are passed onto the screen some of the "Parting Liquid" and water entrapped with them drain into the first hopper. The fraction having the largest volume is placed on the top deck, whether it be float, sink, or middling. The products are then given successive scrubbings as they are moved down the screen by its reciprocating motion by each bank of sprays. After the last bank they are thoroughly dewatered.

Water Seal Take-out

After treatment in the washer section, the fractions are delivered to the water seal take-out which is a side rotating steel drum mounted on trunion wheels running on turned rail sections. It is designed to prohibit the escape of vapor from the washer. It is divided into three compartments; one for each product delivered from the washer. Perforated plates divide the wheel into pockets. The products enter the wheel through chutes which protrude below the surface of the water and form the water seal.

Prepared Monthly by U. S. Industrial Chemicals, Inc.

SOLVENT NEWS

Reg. U.S. Pat. Off.

March ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1939

Tanning of Leather Completed in Hour's Time With Alcohol

Process Yields Better Product With Small Amounts of Solution

LONDON, England—Complete details of the new two stage tanning process which, its inventor holds, will make it possible to produce completely tanned leather in less than one hour have been released here by His Majesty's Stationery Office.

Based upon the combined dehydrating and surface tension-reducing actions of alcohol, the process not only shortens the tanning process to a fraction of the time formerly required, but also yields leather which is substantially stronger, of better color and free from objectionable odor, according to the inventor.

Formula For Sheep Pelts

Only small amounts of tanning solution are required, the patent specification reveals. For example, the following solution is said to be sufficient for tanning 10 dozen sheep pelts (approximately 240 lbs.):

Water	1.5 gals.
Alcohol (denatured)	1.5 gals.
Formalin (40% concentrate of formaldehyde)	3 pints

As the first stage of the process, hides which have been previously pickled are drummed for one half hour in this solution (plus vegetable tanning extracts, fillers and oils, if desired) following which they may be removed in "a practically dry condition."

The process is completed by drumming the hides in a solution containing 5.5 lbs. soda ash and 1.5 gals. water for a short period to close the pores of the skin and retain the tanning ingredients in the fibre.

WANTED: Developer For Unusual Flax By-product

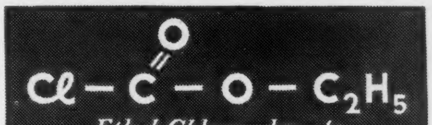
NEW YORK, N. Y.—Tremendous quantities of a by-product of flax manufacture that may be a potential commercial source of alpha cellulose, chlorophyl, pectin, xylose or as a raw material in other fields are now on the market awaiting suitable exploitation, it has been brought to the attention of SOLVENT NEWS.

The material is described as "essentially of short lengths of the woody part of the flax stalk admixed with a considerable amount of the bast fibre and fine dust." Alpha-cellulose (58.37%), pentosans (17.26%), furfural (10.14%) and pectin bodies (7.37%) predominate over other constituents, according to an analysis furnished by the manufacturer.

As part of its service to industry, U.S.I. will be glad to forward inquiries for the material to the proper source.

Describes Universal Buffer For pH Region 2.0 to 12.0

Complete instructions for preparing a universal buffer solution for the pH region from 2.0 to 12.0 are given in a special reprint available without charge from U.S.I. Practically constant buffering capacity, surface tension and cation content are claimed for the buffer mixture. A table shows the amount of hydrochloric to be added to make a solution of any desired pH from 2 to 12. Simply ask for Bulletin 215.



Ethyl Chlorcarbonate

Shellac Imports Off In '38; Predicts Rise In '39

NEW YORK, N. Y.—Total shellac imports into the United States during 1938 fell off 32% from the six-year record high set in 1937, data released by the U. S. Shellac Importers Assn., Inc., reveals. Total imports were 165,601 bags (of 164 lbs. each) as compared with 242,011 bags in the previous year.

Imports of shellac took the greatest drop (45.1%) from 122,939 bags to 67,534 bags. Seedlac declined 21% from 119,172 to 94,029 bags. The remaining 4,038 bags imported in 1938 consisted of Garnet, Button, Stick and Refuse lac.

George Ashby, secretary of the association, predicts an increase in 1939 imports of 40,000 or 50,000 bags.

Spins Viscose Into Bath Of Alcohol to Make "Wool"

LONDON, England—What is believed to be one of the closest approaches to manufacture of artificial "wool" is described here in a recent patent.

Although obtained from viscose, the same material used in the bulk of artificial silk manufacture, the fibres have all the luster and nearly the same curliness with very finely curved crimps that natural wool has, the inventor asserts. Because of numerous, microscopic crater-like openings, they also have much of the same adhesion that is characteristic of real wool, he adds.

The fibres are obtained, according to the patent, by spinning highly ripened viscose directly into a precipating bath of ethyl alcohol. The freshly coagulated fibres are then preferably cut to staple length, and decomposed to regenerated cellulose by treatment with hot air, hot acid or hot 30% sodium sulphate solution.

Frozen Gas Prevents Airplane Crash Fires

ROOSEVELT FIELD, L. I.—To prevent fire hazard in airplanes Assen Jordanoff, transport pilot and engineer, "freezes" gasoline in the tanks to minus 100°C. with a cooling mixture of "Dry-Ice"* and alcohol. At this temperature, Mr. Jordanoff says, the gasoline will remain liquid but will not catch fire. As it passes into the motor the gasoline is heated to normal temperature.

Holding a blow torch above a pail of the "frozen" liquid, the inventor showed that it took fourteen seconds to ignite and then burned slowly rather than with the fierce burst of flame of uncooled gasoline. The weight of the added equipment is reported as about 100 lbs.

*Manufactured and supplied by Pure Carbonic, Incorporated, an associated company of U.S.I.

(Photo by N. Y. Daily News)

Reactivity of Ethyl Chlorcarbonate Key To Many Syntheses

Crystal Violet Dye and Mixed Carbonates Illustrate Range

Although manufactured by U.S.I. for the past ten years, Ethyl Chlorcarbonate still has many of the aspects of a "new" chemical.

Adding weight to this assertion are potential applications for this ester (also known as Ethyl Chlorformate) in the manufacture of rubber accelerators, plasticizers, in the formation of mixed carbonates, as an alkylating agent, and for the preparation of several pharmaceutical products, which continue to appear throughout chemical literature.

Condensation Reaction

Only recently the use of Ethyl Chlorcarbonate as an intermediate for the manufacture of crystal violet, an important dye, by a "hitherto unknown" condensation reaction with the halides of certain N-di-substituted amino aryl compounds served to illustrate that further interest in Ethyl Chlorcarbonate might lie along previously unsuspected lines.

For Flotation Agents

At present a major commercial application for Ethyl Chlorcarbonate is as an intermediate in the production of flotation agents employed in ore refining. This is an exclusive patented process. In still another commercial adaptation, it is reacted with anhydrous ethyl alcohol to yield diethyl carbonate.

According to previous investigators, Ethyl Chlorcarbonate also has another very useful function—that of "protecting" phenolic hydroxyl groups, as in the following reaction:

$$—OH—ClCO_2CH_3 \rightarrow OCO_2CH_3$$

The resulting carbonate is fairly stable to

(*Continued on next page*)

Compares Efficiency Of Wetting Agents In "Wetting Time" Test

NEW YORK, N. Y.—A simple rapid test to determine the comparative efficiency of wetting agents in terms of their "wetting time" was described here recently as follows:

> A Gooch funnel with a 1.5-in diameter and a 3-in. barrel is inverted in a 600 cc. beaker containing a 500 cc. sample of any desired concentration and the whole brought to a standard temperature. The Gooch funnel is then quickly removed, a 1-in. diameter disc of Mount Vernon No. 6 canvas placed in the bottom of the funnel, the latter again inverted in the solution, and a stop watch started at the moment of immersion.

The time required for the disc to begin to sink is called the "wetting time" and the average of four such measurements is used for greater accuracy. Typical results are given in the following table in which R' is a non-fatty alkyl group; R, R_1 and R_2 are various fatty alkyl groupings, and Ar is an aromatic group:

Agent	Wetting Time in seconds at 75°C. 0.5 gram per liter	1.0 gram per liter
$R'ArSO_3Na$	104	57
R_1OSO_3Na	130	66
R_2OSO_3Na	219	108
$RCON(CH_3)C_2H_4SO_3Na$	94	58
$RCOOC_2H_4SO_3Na$	91	52

Ethyl Chlorcarbonate In Many New Applications

(Continued from preceding page)

acid reagents but is readily eliminated by alcoholic ammonia.

In theory, an almost infinite variety of mixed carbonates could be prepared with Ethyl Chlorcarbonate. Ethyl butyl carbonate and ethyl phenyl carbonate are typical of those which have been obtained. Combinations of Ethyl Chlorcarbonate with ammonia yield urethane—and with aniline, phenyl urethane.

Compared with some carbonyl compounds Ethyl Chlorcarbonate is relatively inexpensive. It is because of this that two inventors cite their preference for it in the manufacture of crystal violet. They also point out that, in their method, it reacts in the ratio of one mol to three of halide compound as compared with the more common reaction of one of carbonyl compound to two of halide.

What may prove to be a useful plasticizer is nitrogen triethyl tricarbonate (dicarbethoxy urethane) which has been prepared from Ethyl Chlorcarbonate. This derivative boils at 146.7°C. at 12 mm. of pressure.

U.S.I. welcomes the opportunity to give manufacturers more detailed information regarding particular applications of Ethyl Chlorcarbonate. Samples for investigation may be secured from U.S.I.

Alcohol Mixture Cuts Casein Paint Foaming

HANOVER, Germany—To prevent foaming in casein paints a mixture of equal parts of ethyl alcohol, petroleum and clove oil is suggested in an article published here.

After a discussion of the theories of foaming and foam prevention the author points out that non-foaming is not an indication of purity even though neutral glue foams more than strongly alkaline glue. He says 0.3 to 0.5% of neutral fat considerably reduces this foaming.

Temporary Varnish Protects Polished Surfaces in Transit

A simple way to protect polished metal surfaces from scratches during transit or storage is to cover them with a temporary varnish, according to *Paint Manufacture*. They suggest the following formula:

Cellulose acetate	50 grams
Tetrachlorethane	500 c.c.
Ethyl Alcohol	250 c.c.
Benzene	250 c.c.

It is claimed that this paint dries rapidly, resists scratches and bruises, and is supple, waterproof and easily removed by wiping with benzene or gasoline.

Finds Water Content of Oil Sand With Alcohol and CCl_4

NEW YORK, N.Y.—A new method for determining the water content of oil sands in which the water is extracted with absolute ethyl alcohol and the petroleum with carbon tetrachloride, is described in an article published here.

Finding that the water tolerance of equal volumes of the alcohol extract and carbon tetrachloride depends on the amount of water in the alcohol extract, the author uses experimentally determined curves to arrive at the water content of the oil sand from the observed water tolerance of the mixture.

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

A new disinfectant chemical for more effective and permanent control of "blue stain" in lumber contains ethyl mercury phosphate, according to a recent announcement. **(No. 190)**

U S I

A special nitrocellulose lacquer to prevent marring or scratching of aluminum or aluminum alloy sheets before fabrication was announced recently. **(No. 191)**

U S I

Thorough flameproofing of textiles is claimed for a new powder material said to resist many dry cleanings because of its insolubility in solvents. The material will not stiffen fabrics nor affect the color odor or handle, according to the manufacturer. **(No. 192)**

U S I

A wear and rust resistant surface on iron and steel is claimed for a new finish said to produce an even layer of iron and manganese phosphates on the metal. Parts are first cleaned with a spirit solvent and then immersed in a boiling solution of the finish for from ten minutes to one hour. **(No. 193)**

U S I

A special swelling colloid, described as a synthetic cellulose material, is now available. Soaps made with it are said to produce a strikingly mild, abundant stable lather even with considerably lower fatty acid content. Another use listed for the product is as a thickener in paint removers. **(No. 194)**

U S I

A new coating material for filling old and new wood block floors, for resurfacing and sealing tarpaper and metal roofs, and similar applications, is heat proof and waterproof, chemically inert and does not form bubbles, peel or deteriorate in sunlight, the manufacturer announces. It is supplied as a jelly-like paste which is thinned with water and spread cold over wood, iron, cardboard, cement, etc. **(No. 195)**

U S I

Glass marking inks for writing on bottles, microscope slides, test tubes, etc., with ordinary pens or brushes, are not affected by solvents, acids or alkalies, an announcement claims. **(No. 196)**

U S I

Woven glass fiber gaskets which are soft, pliable, resilient and resistant to practically all acids except hydrofluoric were announced recently. Glass fiber packing for pumps, valve stems, etc., are also reported available. **(No. 197)**

U S I

Quick-acting paint removers said to be suitable for finishes on delicate woods or on metals have been introduced. Although the removers act in 5 to 10 minutes, they do not raise the grain on woods, burn through, harm bristles on brushes, or interfere with repainting, according to the manufacturer. **(No. 198)**

A ready-reference vitamin chart defining all the standardizing units in current use as well as approximate equivalents and conversion factors may be secured free of charge by writing to U.S.I. Ask for Bulletin 120.

Rotation of the wheel lifts the products out of the water, and discharges them into three separate chutes for final disposal. This action is similar to the continuous discharge of a large concrete mixer.

All the water used in the process is collected and taken to the settling tank. In the bottom is the usual form of rake for moving solids into the center of the cone. The weir at the top runs completely around the tank. Concentric with the weir is a scum gutter. "Parting Liquid" caught in the gutter can run to the bottom of the tank.

The "Parting Liquid" having a high gravity, the large droplets naturally settle but small droplets may reach the surface where they immediately break and form a surface "slick" similar to that made by oil on water. This film finally becomes so thick that it breaks into droplets so large that they settle to the tank bottom.

Degraded materials from the products pass through the washer screen to the settling tank with the wash water. Droplets of "Parting Liquid" falling through the water in the tank carry down the small solid particles and keep the percentage of solids in the recirculated water to the washer so low that it can be considered only a trace. Due to this self-cleaning action and the freedom from emulsification of the "Parting Liquid," the settling tank can be made relatively small and operated continuously without building up a high percentage of mud or slime.

The overflow from the tank passes to the surge tank which is connected to the main water circulating pump.

Parting Liquid Recovery System

The sludge removed from the bottom of the settling tank is pumped to the sludge concentrating tank. The circulating liquid tank is large enough to hold the "Parting Liquid" separator charge when repairs to the separator are required. This tank is similar in construction to the settling tank with the addition that there are three side take-outs for removing float sludge from this tank. The material removed through the side take-outs is passed through a filter, the filtrate returning to the tank. The solids, after being washed with water, are discharged into the sludge concentrating tank. Sludge removed from the bottom of the tank is discharged directly into the sludge concentrating tank.

The sludge concentrating tank is similar in construction to the circulating liquid tank. It is located directly above the still and is connected to the still by a plug cock. The sludges collected in the sludge concentrating tank are partially dewatered before passing into the still where the "Parting Liquid" is recovered by steam distillation.

The still located directly under the sludge concentrating tank is lined with fused silica brick. It is constructed so the bottom can be unbolted and lowered for repairs. The top has the necessary inlets and outlets. A hollow shaft fitted with a cross arm for the distribution of the steam used in the distillation is rotated by a small torque motor, assuring complete recovery of the "Parting Liquid" from the sludge.

The steam and "Parting Liquid" vapors pass through a tube and shell condenser where they are condensed, the condensate passing to a water separator, the water returning to the settling tank, and the recovered "Parting Liquid" to the used liquid storage tank for further use.

The equipment is so wired and interlocked that if one piece of equipment stops, all equipment feeding it is automatically stopped and in addition there are the usual emergency control switches located throughout the plant.

Each plant is provided with a blower large enough to change the air in the largest piece of equipment three times a minute. This blower is used only in times of emergency or when the equipment is being repaired. In addition to this, a series of hinged vents running around the bottom of the building are opened in the event "Parting Liquid" vapors escape into the plant and permit the vapors, which are heavier than air, to leave the building at its lowest point.

All plants are provided with a catch-all tank of sufficient size to hold the entire charge of "Parting Liquid." All overflow including drainage and washings pass through this tank.

The range of sizes which can be separated at one time depends on the specific gravities and shapes of the particles treated. The range of sizes which can be washed to remove the "Parting Liquid" after separation depends on the shape of the particles. A maximum size ratio of four to one is permissible. The process is applicable to coal and to all other minerals which can be freed from their gangue or from each other in sizes plus 8-mesh Tyler standard screen scale and where one of the minerals has a gravity less than three. The process may be used on run-of-mine feed or as a preliminary concentrator or rougher-out ahead of other processes or for recovering the values in tailings or refuse delivered from existing plants.

Due to the fact that the specific gravity of the "Parting Liquid" remains constant in operation and that its viscosity is equivalent to that of water, it is possible to sort materials having exceedingly close specific gravities; for example, Quartz, sp. gr. 2.66 from Calcite, sp. gr. 2.71.

Reagent for Sodium

Resorcinol sulfonic acid is suggested as a new reagent for the detection and estimation of sodium. A. Barreto (*L'Ind. Chim.* from *Revis. Chim. Ind. Rio-de-Janeiro*) writes that it reacts with sodium salts to produce a white crystalline precipitate very slightly soluble in water and insoluble in excess of the reagent. With potash salts it also gives a precipitate, but this is soluble in excess of reagent.

New Welding Gas

Pseudo-butylene, or beta-butylene ($CH_3.CH:CH.CH_3$), a gas obtained by the action of catalysts on ethylene or by the thermal decomposition of butyl alcohol, possesses properties which render it of considerable interest for welding and metal-cutting purposes. The Russian chemists, Falkewitsch and Tschepeljugin (through *L'Industrie Chimique*, December), who carried out investigations on the subject, state that the gas burns in oxygen with a particularly hot flame and has been successfully used for cutting pieces of steel of thicknesses up to 300 mm. The flame is easily regulated.

Kyanite as a Ceramic Material

The steadily growing market for kyanite in the preparation of refractories is the subject of an article in Vol. XXXVI, No. 4, Oct.-Dec., '38, *Bulletin Imperial Institute*. Kyanite, which is a natural silicate of alumina (Al_2SiO_5 or $Al_2O_3.SiO_2$), is not used in the raw state, but is first fired at 1450° to 1500° C., then ground ready to mix with the bond. This preliminary firing completes a large volume change which would otherwise take place on burning and shatter the brick; it also converts the kyanite into a mixture of mullite and silica according to the equation:

$$\underset{\text{Kyanite}}{3(Al_2O_3.SiO_2)} = \underset{\text{Mullite}}{3Al_2O_3.2SiO_2} + SiO_2$$

The product of calcination, however, is known in the trade as "sillimanite," a misnomer which often leads to confusion. Sillimanite and andalusite are other natural minerals of exactly the same chemical composition as kyanite (but differing in physical properties), and both are likewise converted on heating into mullite and silica. The conversion of andalusite into mullite is not accompanied by any change in volume and this mineral can therefore be used in the raw state as a refractory. Up to cone 20 sillimanite may also be used in the natural state, but in order to produce a body of constant volume it would be necessary to fire it previously well above cone 20 (1530° C.). The article takes up uses and adaptations, and describes also sources of output, with estimated production.

Acid-proof Filter Cloth

"DuraKlad" Filter Cloth is a new type of cloth guaranteed by the manufacturer to withstand concentrated solutions of nearly all organic acids. Product, available in various weaves and widths, is especially recommended by manufacturer, Wm. W. Stanley Co., 401 Broadway, New York City, for all unusually difficult filter problems.

Micronized Clay

Of interest to the porcelain enameling industry is a superior clay which has been refined by the Micronized process. With the introduction by Porcelain Enamel & Mfg. Co., Balto., Md., comes the statement that a Micronized product is one that has been broken down to a grain size ranging from one to ten microns by the Micronizer reduction process.

Isolates Lignin in Wood

Many years' research by Dr. F. E. Brauns, Institute Paper Chemistry, Appleton, Wis., has culminated in isolation of lignin as it occurs in wood. Lignin must be removed along with other materials from wood before satisfactory paper pulp can be produced, and its chief present use is as a waste material, although a small amount is used in manufacture of vanillin as a road binder, as a tanning material, and as a source of yeast.

Transparent Thermoplastic Material

A transparent thermoplastic material developed from potato starch is reported by the Bureau of Foreign & Domestic Commerce. In transparent form it is known as Anras-glass, and as Amylite when opaque. In transparent form it is said to have superior optical properties with ultra-violet light. New material has sufficient strength to be used in combs, hot-houses, leaded glass windows, displays and boxes. It may be readily bored, sawn, ground or shaped, and may be colored with a wide range of dyes and pigments. In the present stage of development, however, it retains a sensitivity to immersion in water. The Anras-combinatie, a research organization, with headquarters at Veendam, Netherlands, is responsible for the product.

Sulfonated Synthetic Resins

Water-insoluble artificial aldehyde resins containing a sulfonic acid group or groups are manufactured by condensing an aromatic compound, containing at least one sulfonic acid group and having a tendency to condense, with an aldehyde or agent yielding it, or by treating an artificial aldehyde resin with a sulfonating agent. In examples: (1) phenol-*p*-sulfonic acid is condensed with formaldehyde; (2) phenol is sulfonated and the product is condensed with formaldehyde; (3) naphthalene is sulfonated and the product is condensed with formaldehyde; (4) a resin made by condensing *m*-phenylenediamine with formaldehyde is sulfonated with fuming sulfuric acid. Subject is the basis of E.P. 489,437, described in *Chemical Trade Journal*, Nov. 11, '38, p. 454.

Plastic for Use in Embedding Articles

A plastic material, for embedding articles, called "Einbettmasse HFK," has been developed by the I. G., Frankfort-am-Main, Germany. Product is a colorless urea-formaldehyde resin having the consistency of honey. In order to cause it to set, a coagulating agent is added, which, in a few hours, transforms the whole mass to a solid of rubber-like consistency, still quite transparent. The object is laid in a basin half lined with the plastic, then more of the material poured in on top, the coagulating agent having already been added. It has been found possible to embed dry plants, beetles, anatomical specimens, etc., without preparation. Since the plastic is slightly acid, some natural colors in plants are destroyed in course of time. Chemicals may be added to prevent the loss of color in some cases, as for instance, the chlorophyll in the leaves of plants. Original reference appeared in *British Plastics, 10,* 351-352.

Month's New Dyes

General Dyestuff has released Brilliant Indo Green 3G, a new acid wool dyestuff of a particularly clear shade. It possesses good fastness to water, washing, milling and sea-water, combined with comparatively good fastness to light.

Four new dyestuffs for use in the textile and paint manufacturing industries are announced by du Pont. Two are stabilized azoic printing colors for cotton, known as "Diagen" Blue MGD and "Diagen" Golden Yellow MRS. Both produce attractive self shades, and since they have the diazo component will produce in combination a wide range of browns, not sensitive to variations in ageing or finishing. "Lithosol" Scarlet Base MB is similar to "Lithosol" Scarlet Base M, but is bluer in shade. It gives darker and deeper top mass tones very close to that of light top mass tone para reds. Du Pont Wood Stain Scarlet NS Concentrated is designed for stains containing organic solvents which prevent raising of the grain in wood, caused by water stains. It is equal in strength and slightly more yellow in shade than du Pont Crocein Scarlet N Extra. The pH of stain is such that it will not corrode cans in which it is stored.

Chlorinated Rubber Plasticizers

In the manufacture of varnishes, enamels, and the like, chlorinated rubber is plasticized by an ester containing a halogen or ether group, but not more than one ester group, the amount of plasticizer being insufficient to liquefy the rubber chloride. Generally 5—30 per cent. on the weight of the chloride is added. In E. P. 498,977, described in *Chemical Trade Journal*, Nov. 11, '38, p. 455, numerous examples are specified, including mono and di esters of dichlorhydrin and aliphatic esters of other alcohols such as the oleates, palmitates, and stearates of ethers of ethylene glycol. The rubber chloride is suitably that prepared according to E.P. 489,954. According to an example, to 1,000 parts of toluol and 240 parts of xylol are gradually added 420 parts of rubber chloride. This is thinned with 240 parts of solvent naphtha in which is dissolved 104 parts of cumar-indene resin. One hundred parts of methoxyethyl oleate are stirred in to give a brushing varnish drying in 0.5 hours.

Aluminum-Tannin Tannage

That a chrome pretannage increases the fixation of vegetable tannin is a known fact, and is assumed to be due to a blocking of the carboxyl groups by the chromium, thus activating the amino groups. The analogy between chrome and alum tannages suggests that an alum pretannage might be similar in action.

A solution of aluminum sulfate was made up containing 1.65 per cent. Al_2O_3, brought to a basicity of 22 Schorlemmer with sodium carbonate. Hide powder containing 70 per cent. moisture was treated with this solution for 3-hour and 24-hour periods. These samples, together with an untreated portion, were then tanned with quebracho. There was a greatly increased fixation of tannin in the pretreated samples, the 24-hour treatment being superior to the 3-hour.

Tannage periods (with quebracho) of 24 to 192 hours showed increase of fixation with increasing time for both straight and pretreated samples, but the maximum fixation for the straight quebracho tannage was much less than the minimum fixation for the pretreated sample.

The effect of increasing concentrations of liquors (using quebracho, chestnut and sumac) was to increase the fixation of tannin for all samples, but in every case, the fixation of tannin was greater in the combination leathers than in the straight vegetable tannage.

Aluminum pretannage also leads to a greater fixation of sulfite cellulose, although not so marked as with tannin. These results were confirmed by tannages using calf skin instead of hide powder. The aluminum sulfate should precede the tannage, and not be simultaneous, on account of the precipitation of tannin by aluminum sulfate.—C. Otine and G. Alexa, in *J. I. S. L. T. C.*, mentioned in *Hide and Leather and Shoes*, Feb. 11, '39, p. 16.

Chemical Specialties for Industry

A digest of new uses and new compounds

Dr. Charles F. Mason

Discusses

Spot Removers

THE term "Dry Cleaning" probably has created illusions in the minds of the curious and misconceptions in the minds of our fast growing army of pseudo-scientists who, although engaged in pursuits, far removed from science, are always eager to commit themselves upon the injurious effects of chemicals, whether wet or dry. The average person, who has never used benzine, gasoline or even kerosene for removing spots from fabrics, must have assumed that the operation and materials used were far from dry ones, and that "Dry Cleaning" was perhaps coined to suggest the absence of water.

Not many years back this operation was confined exclusively to the household and to small tailoring establishments, where the only solvent used was petroleum naphtha. This includes the three solvents mentioned in the first paragraph, but as a result of disastrous fires and explosions local communities have had to enforce fire regulations. Today garments are collected by motor vehicles and delivered to large plants in the suburbs, where elaborate ventilating, drying and solvent reclamation equipment reduce the hazards to a minimum.

This has become a large industry not only in crowded metropolitan centers, but also in rural sections, where a suit may be dry cleaned as far as fifty miles from the owner, and where the fluids are purchased by the barrel, in some cases in tank car quantities. Establishments which specialize in cleaning men's suits, which are usually of the darker shades, use only petroleum naphtha and non-inflammable carbon tetrachloride, because extra care is not necessary and there is relatively little injury to the fabric and deposition of rings. Women's clothes, which are more fragile and are dyed with every shade and tint of the basic colors imaginable, must be treated with greater care, and, as a result, many solvent combinations have been offered to the trade based largely upon rule of thumb methods.

In textile districts of large cities manufacturing, altering and wholesale distributing are carried on in the same city block by companies ranging in size from one employee to a thousand. Dry cleaning fluids sold to such concerns must meet at least five specifications. These are price, flash point, color, odor and cleansing power. Many cities enforce the regulation, that for factory use the flash point must not be below 100° F. and for home use not below 120° upon the same scale, the assumption being that the danger of fire in factories is less than that in the home because in the former experienced operators and ventilating equipment are available.

However, the rate of evaporation and physiological effects upon the operators are two important factors, usually ignored by producers, who rely too much upon information obtained from salesmen of solvents. The purpose of a dry cleaning solution is to simultaneously dissolve, loosen and float off the undesirable substance in the shortest possible time. This is accelerated in the home by rubbing, but in factories, where labor costs are important, the employee only has time to find the spot and wet it while the garment is spread upon a table over blotting paper or an absorbent powder. By capillary action the absorbent attracts the solvent, which is now a solution, and prevents the accumulation at the outer edges caused also by capillary attraction and in every day language termed a ring.

The formation of rings has led to exorbitant claims in advertisements; so exorbitant in fact, that The Federal Trade Commission has interceded in some cases with orders to stop such practices. Many theories have been advanced such as, removal of the size from the fabric, concentration of the undesirable substance at the outer edge upon evaporation, and differences of cleanliness in the cleaned portion and the fabric as a whole. Each is worthy of consideration. It is outside the scope of this report to consider each separately, in view of the wide variety of sizes and mordants now used, but the writer leans strongly to the latter two and feels that more care in the application and subsequent removal of the fluid will keep ring formation at a minimum.

A feature of capillary attraction phenomena, useful to dry cleaners, is that if the solution is poured around the outer edges of a spot instead of upon it, the fluid will tend to draw toward the center carrying dissolved substance with it. Upon reaching the center, while evaporation is going on simultaneously with absorption from below, a concentrated solution will be at one point in the center and can be wiped off. Some establish this condition by using a large applicator like a medicine dropper, resulting in more economy with the fluid and obtaining better results.

No claim is made that the formulae given herewith cover all cleaning fluids now on the market, because producers have the attitude that the higher the number of solvents in a mixture, the greater is the dissolving power. This is true and necessary, when one considers the wide variety of greases, paints, oils, and other foreign substances with which a garment may be soiled. However, those listed are representative and, for convenience, are divided into three classes.

EMULSION TYPE

1.	Benzine	40
	Acetone	20
	Soap solution	10
	Treated alcohol	30
2.	Ethyl ether	30
	Ethyl acetate	20
	Soap solution	20
	Treated alcohol	30
3.	Tetralin	25
	Xylol	20
	Soap solution	20
	Treated alcohol	20
	Benzine	15
4.	Carbon tetrachloride	70
	Benzine	25
	Soap solution	5

This type of cleaning fluid, only recently adopted, tends to separate into two layers, which necessitates the familiar precaution of shake well before using. Such fluids have the added advantage of the presence of water, which may dissolve the substances not soluble in the other components and is an inexpensive way of introducing soap, which will, by emulsifying, aid in the removal of foreign substances. The disadvantage is that

the portion must be rinsed in distilled or recently softened water, to remove excess soap and avoid the formation of insoluble calcium soaps.

The treated alcohol is made by adding solid ammonium chloride to denatured alcohol and, after standing at least over night, pouring off the clear, supernatant liquid. Many add about five per cent. concentrated ammonia, also. The soap solution is prepared by adding six parts of oleic acid to seven parts of tri-ethanolamine and, after stirring thoroughly, adding eighty-seven parts of denatured alcohol and agitating again.

NON-INFLAMMABLE TYPE

1.	Carbon tetrachloride	40
	Benzine	40
	Tri-chlor-ethylene	19
	Benzine soap	1
2.	Carbon tetrachloride	88
	Benzine	10
	Soap solution	2

This soap solution is prepared by dissolving acetaldehyde sodium sulfite double salt in equal parts of water and alcohol and, after standing over night for the solids to settle, pouring off the clear, supernatant liquid.

3.	Oleic acid	2.87
	Methyl hexalin	4.30
	Sodium hydroxide soln. 50°	1.15
	Water	1.68
	Carbon tetrachloride	90.00
4.	Oleic acid	1.48
	Methyl hexalin	1.76
	Sodium hydroxide soln. 50°	0.59
	Water	1.17
	Alcohol (denatured)	50.00
	Tri-chlor-ethylene	45.00
5.	Oleic acid	3.35
	Tri-ethanol-amine	3.35
	Tri-chlor-ethylene	80.00
	Alcohol	13.30

The standard of non-inflammability is sixty of chlorinated hydrocarbon and forty of an inflammable one like petroleum naphtha; however, such a mixture is not dangerous as long as it is kept in a closed container to prevent evaporation. If left open the chlorinated hydrocarbon evaporates rapidly, more rapidly than the other component, and soon an inflammable mixture is present. Many think that benzine soap retards the fire hazard. There is some evidence in its favor because, long before the chlorinated hydrocarbons were available at present prices, explosions and fires were reduced after it had been introduced into the dangerous petroleum distillates of that time.

INFLAMMABLE TYPE

1.	Ethyl ether	40
	Benzine	50
	Amyl acetate	8
	Soap	2
2.	Acetone	30
	Alcohol	30
	Benzol	38
	Soap	2
3.	Ethyl acetate	20
	Benzol	30
	Xylol	30
	Benzine	19
	Soap	1
4.	Benzine	63
	Carbon tetrachloride	36
	Soap	1
5.	Benzine	53
	Tri-chlor-ethylene	20
	Carbon tetrachloride	26
	Soap	1

The soap is sold under the trade name of Benzine Soap and is a hard soap of potash instead of the softer sodium varieties. It is only dispersed in the mixture and is deposited upon the fabric to be wiped off as described in previous paragraphs. Very little of it is dissolved because its presence is easily discernible to the naked eye. The similarity in chemical structure of the chlorinated ethylenes to chloroform has prompted certain salesmen to spread the rumor that they are nearly as toxic as this one, which was the first to be introduced into medicine, but it is yet to be proven.

In concluding, it seems strange that with the large and ever increasing influx of new solvents into the trade very few have been adapted to dry cleaning. The primary reason is price—the newer petroleum distillates have been adopted widely, but another reason is that the industry is in the hands of men who, to survive the competition of business, feel that letting well enough alone is the best policy. However, it is another industry, where employees and owners alike do not appreciate the laws of nature, and violation of fundamental principles leads to the ever present troubles of non-technical people doing technical operations.

Synthetic Waxes

Carnaqua Waxes, for the manufacture of waterproof, bright-drying, wax-synthetic resin emulsions, are a group of two new synthetic waxes having much the same characteristics of carnauba wax, in addition to being self-emulsifying and giving water-insoluble films. The waxes disperse in water to form water wax emulsions of extreme stability. When a Carnaqua Wax Emulsion is modified by "Resoid-M2" or some other similar type of synthetic resin solution, a material results which gives absolutely waterproof films, being also very glossy, durable and self-leveling. These properties make the waxes of interest to manufacturers of bright-drying floor waxes, shoe polishes, battery case finishes, sign painters' inks, etc. Manufacturer, Beacon Co., 89 Bickford St., Boston, Mass., states the waxes are available in two grades: Carnaqua No. 1 and Carnaqua No. 2, the difference being in color only, and in the color of the finished emulsions.

Air Seal Compound

A compound which will eliminate 90 per cent. of all common tire punctures, according to the manufacturer, has been introduced by U. S. Air Seal, Inc., Girard, Ohio. Known as Air Seal, it is a plastic compound of English invention made of asbestos, glucose, magnesia and other chemicals. Manufacturer guarantees that it will effectively seal porous tubes, will not injure but actually preserve rubber, will not bake or freeze in the tire, will not clog valves or impair functions, and will not interfere with vulcanizing or other necessary tire repairs.

Metal Conditioner

A successful method of preparing rusted metal surfaces for painting is reported in development of Corrosol No. 2, product of International Rustproof Corp., 12507 Plover Ave., Cleveland, O. Corrosol is an ortho-phosphoric acid and alcohol solution reinforced with reduced chromates in which manganese dioxide and iron filings are used as reducing agents for the chromates. As soon as the iron and manganese have properly reduced the chromates, the excess metals are filtered off leaving the solution slightly green in color, but free of excess metals so that the acidic strength will not be further reduced. When applied to a rusted metal surface, it immediately attacks the rust, breaking down the rust formation, and releases the crystallized moisture which is immediately absorbed by the alcohol and expelled by evaporation. It converts the iron oxide (rust) into an iron phosphate and also leaves a deposit of ferrous chromates on the metal surface. Corrosol does not have to be rinsed or wiped off as the acid reaction will completely satisfy itself on the surface of the metal by formation of iron phosphates. It can be applied to all types of heavy steel structures, and is ideal for use around gasoline storage tanks in eliminating the fire hazards of sand-blasting.

Unusual Uses of

Glycerine

RESEARCH on the versatility of glycerine brings to light many interesting industrial applications, and the findings of the Glycerine Producers' Ass'n on the value of glycerine as a rubber lubricant and the seasonal suggestions on anti-fogging compositions, as well as other unusual uses, are abstracted from their bulletin, *Glycerine Facts*, January, 1939.

Many large transportation companies and individual truck and car owners are familiar with the efficiency of glycerine as a windshield wash, which aids clearer vision and permits safer driving. Two new anti-fogging compounds are of interest.

U. S. P. 2,107,361, a liquid for use on windshields, windows, etc., recommends:

Glycerine	1 gal.
Camphor	4 oz.
Turpentine	½ pt.
Potassium oxalate	1 lb.
Oxalic acid	4 oz.

Ingredients are dissolved by heating together on a water bath, and mixture applied by wiping the glass with a sponge dipped into the preparation.

In paste form is another somewhat similar formula for a windshield mist preventative for which users report good results. This composition calls for:

4 oz. Potassium Oxalate	112 gr.
2 oz. Glycerine	60 ml.
1 gr. Camphor	0.1 gr.
1 oz. Turpentine	30 ml.

Heat on water bath.

Application of this product is reported to be beneficial both on the inside and on the outside of the windshield. Use on the outside of the windshield causes the rain to flow more evenly so that it does not reflect and refract street lights and the lights from other cars. On the inside, its use prevents accumulation of mist or fog, resulting in clearer visibility, and easier and safer driving. Product is applied to a clean windshield and rubbed well with a clean cloth.

A recent series of experiments by Aquadro and Barbour, as reported in *American Journal of Nursing*, have proved and definitely established the exceptional value of glycerine as a rubber lubricant without detrimental effects on this material.

In this work, glycerine and mineral oil were compared as lubricants for rubber catheters. The tubes were lubricated with each of these fluids, after five minutes were washed with a soap solution, rinsed with water and then boiled for five minutes. After 37 boiling periods, the oil-treated tubes were flaccid, without resiliency, cracked and otherwise unfit for use. The glycerine-treated catheters, after 200 boilings, were still firm and only a little lighter in color, as compared with a non-lubricated but similarly treated control tube.

The fact that in addition glycerine in the long run is the more economical of the two is an added factor to be considered when a commercially practical lubricant for rubber is desired, whether for an item like rubber gloves or tubes or for rubber rollers or shackles.

For workers whose occupations necessitate frequent hand-washing, it is particularly desirable during the winter that the water be softened in order to prevent as far as possible chapping and roughness. The following simple mixture is advocated by many users:

Glycerine	10
Borax	3
Sodium carbonate	2
Orange flower water, triple	85

(A tablespoonful to a basin of water is usually sufficient.)

An effective and easily applied silver polishing soap is suggested in G. Martin's *Modern Soap and Detergent Industry*. Manufacture of this milled silver soap is as follows:

Fifty pounds of good white curd soap with good moisture content are passed through the milling machine and then mixed with 50 of the finest precipitated chalk, five pounds white refined glycerine, and seven ounces of a mixture of lavender oil and French geranium oil. The mixture is milled slowly, a small proportion at a time.

Appy the soap with a piece of flannel moistened with warm water and rub the surface until the desired shine is obtained.

A soap designed to make cotton uninflammable after washing can be made by mixing together:

Dry powdered soap	180
Sodium silicate	24

This is made into a paste with:

Potassium carbonate	8
Glycerine	7
Sodium tungstate	4

With the potential menace of industrial ducts to health and property now generally recognized as a definite danger, there is an increasing interest in "dust counts" as the first step in elimination or minimization of this hazard, by determining the dust deposition in the neighborhood of a factory or plant. The many ingenious optical devices for making accurate counts are as a rule quite expensive. An equally accurate yet simple method for making these studies consists of exposing glass slides smeared with glycerine-gelatine.

The dust particles deposited on the film in a given time at varying distances from the source of the air pollution can readily be counted under a microscope. The glycerine-gelatine jelly can be made as follows:

Glycerine	3½ oz.
Gelatine	½ oz.
Water	3 oz.
Phenol	1 dr.

Dissolve the gelatine in the water and when completely dissolved, add the glycerine and the phenol. Warm for 15 minutes with constant stirring. (Do not allow the temperature to rise over 75° C.) When cooled and solidified, drain off the excess water. Store the jelly in a cool place in an air-tight container.

This jelly may also be used for mounting microscopic specimens.

For various purposes in plant and laboratory it is frequently desired to color glycerine. The following colors, in quantities varying from one to two ounces per gallon of glycerine, depending upon the depth desired, may be used:

Yellow—Auromine	Orange—Chrysoidine
Scarlet—Pylam Scarlet No. 1323	Violet—Methyl Violet
Green—Malachite Green	Black—Pylam Basic Black
Blue—Methylene Blue	Brown—Bismark Brown

Corks can be easily acid-proofed by a simple process in which glycerine is utilized.

First place the corks to be treated in a solution of glycerine two parts, gelatine one part, and water 40 parts and heat at from 112 to 120° F. for several hours to permit the fluid to penetrate the cork. After this teatment the corks should be wiped clean and will be found to retain their elasticity.

The next step is to cover the treated corks with a mixture of petrolatum two parts and paraffin seven parts, heated to about 105° F. An alternative to the use of this mixture is use of a small quantity of ammonium dichromate dissolved in the glycerine-containing solution. After this latter treatment the corks should be exposed to light.

Coating Material from Corn

Corn Products Refining Co. is now producing a protein material, called Zein, for use in coating or glazing fine magazine papers.

New Hat-size

"Siz-In," a new hat sizing which is said to give a felt hat its original body and stiffness along with the soft finish found in a new hat, is announced by Sanitary Products Co., Greenville, S. C. Changes in temperature have no effect on hats which have been so treated. Product is said to be non-explosive, non-inflammable; ready for use, and will not injure fabric, although it is not recommended for cotton hats.

Mahogany Stain

Victorian Mahogany, a beautiful rich warm reddish brown mahogany stain for use on gum, birch and maple, is announced by V. J. Dolan & Co., 1830 N. Laramie Ave., Chicago. New stain represents an unusual combination of anilines and pigments perfectly blended in special solvents. Method of application as well as the product itself is new and different.

Protective Coating

Pliacote, a pliable, flexible coating for interior and exterior protection of all types and sizes of containers against corrosive liquids, semi-solids and gases, is a new development of Thompson-Hayward Co., Kansas City, Mo. Product is of interest to the entire chemical industry, also finding wide application in many other industries. It has many of the characteristics of the mineral waxes, but has the unique quality of being extremely pliable and tenacious: will hold with almost unbreakable bond to metal, glass, wood, cardboard, etc. With a melting point of 160° A. M. P., it is easily applied and forms an impervious, protective lining or coating which does not become brittle or crack or chip at low temperatures. It is not subject to sag or flow at high temperatures reasonably lower than its melting point, and is resistant to the washing action encountered normally in emptying and filling tanks and containers.

Aluminum Paints

A group of aluminum paints, known as Permite, divided into two forms: one for Maintenance Work, and one for Product Finishing are being made by Aluminum Industries, Inc., Cincinnati, O. The former group includes a high heat-resisting type with an exclusive synthetic alkyd resinous vehicle, which permits its use on iron and steel where temperatures range from 450 to 1000° F. This group also includes Permite "Outdoor" Aluminum Paint, a superior, long oil type for exterior applications; a wet surface type for application on wet, damp or moist surfaces; a quick drying type; a medium oil length type for machinery and equipment; a utility grade for interior appearance and illumination; a general purpose maintenance type; and one to meet federal specifications. The Product Finishing group includes a quick drying, ready-mixed aluminum paint that dries to touch in 10 to 15 mins. for application on toys, ornaments and all kinds of wood and metal products; a Ready-Mixed Nitrocellulose Spraying Lacquer that dries to touch in 5 to 10 mins.; a very fast drying spraying lacquer which dries to touch in ½ to 2 mins. and dries hard in 3 to 5 mins.; a short oil synthetic grade of ready-mixed aluminum paint intended for use where a very smooth and brilliant finish is desired; and a dipping type which can be air dried or baked at 300° F.

Insulating Powder for Steel Treatment

Lapix, a finely powdered insulating material, for use in open-hearth departments in the treatment of fully killed steel, has been put on the market by E. F. Houghton & Co., Phila., Pa. It is said to materially reduce discards, and definitely reduce porosity and secondary pipe where such tendencies occur.

Spray for Greenhouse Plants

Use of red copper oxide as a spray for greenhouse seedlings to prevent damping-off, stem cankers, and leaf diseases in place of Bordeaux mixture or copperline dust, as previously recommended, seems to be supported by evidence accumulated in tests made at the State Experiment Station, Geneva, N. Y. One of its chief advantages is in the fact that it does not stunt growth of the plants. It is recommended that seedlings be sprayed weekly with a mixture of red copper oxide, 1 lb. to 50 gals. of water or 1 ounce to 3 gals. Station workers point out that red copper oxide is difficult to suspend in water and that a suspendible grade has been worked out with a manufacturer. New material is available under the name of "Cuprocide 54."

Control for Peach Borer

Hailed as being more effective in controlling borers in peach trees than standard materials now used, as being easier to apply and with less danger of injury to the tree, and as being less expensive, a chemical widely used in grain fumigation is now advocated for use by peach growers by Dr. D. M. Daniel, State Experiment Station, Geneva, N. Y. New material is an emulsion of a chemical known as ethylene dichloride and potash fish-oil soap diluted with water and applied directly to the trees regardless of age. It can be poured or sprayed about the base of the tree with equally good results and can be applied at a time when other orchard work is not pressing.

Textile Flameproofing Agent

Quaker Pyr-E-Pel, a flameproofing agent for fabrics, possessing unusual characteristics, is announced by Quaker Chemical Products Corp., Conshohocken, Pa. It is described as a white crystalline powder which is used in 10 to 25 per cent. concentration of flameproofing crystals in water, depending on the type of fabric. It has the following outstanding qualities:

1. Thoroughly flameproofs, retards fire.
2. Possesses no afterglow.
3. Imparts body, adds weight.
4. Does not stiffen the fabric nor affect the handle.
5. Due to its insolubility in solvents, it is resistant to many dry cleanings.

Product is stable and is not affected by liberal amounts of acids, alkalis or salts; does not coagulate colloidal solutions, and is compatible with starches, dextrins, gums, oils, waxes, and sulfonated oils. It may be used in the same bath with finishes and pigments.

Textile Finishing Agent

Cellofas WLD, a water-soluble cellulose derivative designed to replace starches, dextrins and natural gums, has been developed as an improved textile finishing agent by Imperial Chemical Industries, London, England. Product is sold in the form of white flocks. It is uniform in composition and when dissolved in water forms viscous solutions which, apart from a few undissolved fibres, resemble those obtained from natural gums. Solutions are neutral, extremely resistant to the action of light, alkalies, and atmospheric oxidation, and do not ferment or become acid on standing. Cellofas WLD is soluble in cold water up to temperatures of approximately 30° C., but is insoluble in hot water. Although finishes obtained by its use resist washing better than corresponding starch or natural gum finishes, it should not be regarded as a "permanent" finishing agent. Its binding properties are much superior to those of starch and the product can carry a much greater proportion of filler than can be applied satisfactorily to yarns or fabrics from a starch mix. When used alone it gives a full, supple handle to yarns or fabrics and a finish that is tough and resistant to friction. It may be applied in any ordinary textile machine, such as a padding mangle or back filling machine, and only requires can or stenter drying and any of the usual mechanical finishing processes after application.

New Trade-Marks of the Month

371,867. General Plastics, Inc., No. Tonawanda, N. Y.; Nov. 22, '35; for materials of construction being bonded or cemented with a resinous bond; use since June 1, '35.
385,422. Howard R. Neilson (Neilson Chemical Co.), Detroit, Mich.; Nov. 11, '36; preparation for removing oils, greases, waxes, road scums, films, etc., from painted, lacquered and enameled surfaces, and otherwise conditioning such surfaces for repainting or refinishing; use since May, '35.
390,381. Rapid Gas Corp., Cedar Rapids, Iowa; Mar. 22, '37; liquefied petroleum gas; use since Feb. 20, '36.
393,361. B. T. Babbitt, Inc., New York City; May 28, '37; cleanser for metal, linoleum, wood, etc.; use since 1910.
394,065. Twin City Shellac Co., Brooklyn, N. Y.; June 14, '37; prepared shellac, paint-varnish remover, furniture polishing wax, and similar industrial specialties; use since Feb. 4, 1930.
394,200. Societe des Antiferments, Neuilly-sur-Seine, France; June 17, '37; deodorant; use since May 13, '37.
398,753. Black Bear Co., Long Island City, N. Y.; Oct. 21, '37; printing-stencil-and marking inks; use since Oct., '36.
399,332. Sandy Valley Grocery Co., Ashland, Ky.; Nov. 4, '37; lye and baking soda; use since May 13, '35.
399,365. Mathieson Alkali Works, New York City; Nov. 5, '37; fused soda ash briquettes for controlling slag in open-hearth steel furnace practice; use since Sept. 28, '37.
399,657. Glidden Co., Cleveland, O.; Nov. 12, '37; soybean flour, for use in making plastics, adhesives, and similar products; use since Jan. 17, '36.
399,851. H. A. Montgomery Co., Detroit, Mich.; Nov. 17, '37; lubricants; use since July 9, '37.
400,646. C. Howard Hunt Pen Co., Camden, N. J.; Dec. 9, '37; ink; use since Nov. 30, '37.
401,211. Eugene Dietzgen Co., Chicago, Ill.; Dec. 24, '37; drawing and writing inks; use since Jan. 1, 1925.
401,308. Liberty Labs. Corp., Boston, Mass.; Dec. 28, '37; insecticides; use since Oct. 25, '37.
401,683. U. S. Graphite Co., Saginaw, Mich.; Jan. 7, '38; graphite; use since Mar. 4, '36.

† Trade-marks reproduced and described cover those appearing in the *U. S. Patent Gazette*, Jan. 10 to Feb. 14, inclusive.

406,713. Goldsmith Bros., New York City; May 25, '38; liquid wax polish; use since May 24, '38.
410,262. Masonite Corp., Chicago, Ill.; Sept. 3, '38; paste adhesives; use since June 16, '38.
403,752. Wm. J. Bussert, Maywood, Ill.; Mar. 7, '38; preparation for use in prolonging life and beauty of cut flowers; use since July 1, '37.
404,646. Gesellschaft fur Neuzeitliche Bodenbehandlung m. b. H., Naaki-Vertrieb, Neubrandenburg and Berlin, Germany; Mar. 30, '38; insecticides, fungicides and silica products for protection plants, etc., against attack by insects, fungi, and decomposition; use since Feb., '37.
408,719. A. Krasne, Inc., New York City; July 20, '38; household cleaner for tile, porcelain, etc.; use since Mar. 31, '38.
410,261. Masonite Corp., Chicago, Ill.; Sept. 3, '38; paste adhesives; use since June 16, '38.
410,557. Sinclair Refining Co., New York City; Sept. 14, '38; compound for removing paints; use since Aug. 30, '38.
410,585. Lyda A. Exley (Hom-Protector Co.), Savannah, Ga.; Sept. 15, '38; roach paste; use since July 5, '35.
410,646. Fink-Roselieve Co., New York City; Sept. 16, '38; preparations and chemicals for developing film after exposure; use since Sept. 7, '38.
410,894. Barta-Griffin Co., Worcester, Mass.; Sept. 23, '38; compound to be mixed with printing ink for prevention offset, filling, picking and sheet sticking, and in color process work, holding first color open and making other colors take better; use since Feb. 10, '38.
411,739. Philip O. Gravelle (Gravelle Lab.), So. Orange, N. J.; Oct. 18, '38; chemical solutions for imparting color to photographic and other prints; use since Apr., '38.
411,752. Pierpont & Grow Products, Muncie, Ind.; Oct. 18, '38; cleaning and polishing compound for aluminum, brass, glass and like products; use since Aug. 1, '38.
411,037. Susan Overstreet Parker, Jacksonville, Fla.; Sept. 27, '38; insecticide; use since Nov. 17, '37.
411,157. John F. Feck, Cincinnati, O.; Oct. 1, '38; lubricating oils and greases; use since Mar. 3, '37.
411,181. Reichhold Chemicals, Inc., Detroit and Ferndale Sta., Detroit, Mich.; Oct. 1, '38; resins, plastic resin solutions, and oils, for use in paints, lacquers, etc.; use since Sept. 16, '37.
411,431. Paul Cimino, Wilkes-Barre, Pa.; Oct. 3, '38; shoe polish and cleaner; use since Jan. 1, '37.
411,606. E. F. Houghton & Co., Phila., Pa.; Oct. 14, '38; compound for use on top of hot steel after casting in molds for purpose of eliminating pipe; use since July 29, '38.
411,718. A. E. Staley Mfg. Co., Decatur, Ill.; Oct. 17, '38; laundry starch; use since Sept. 16, '38.
411,876. McLaughlin Gormley King Co., Minneapolis, Minn.; Oct. 21, '38; insecticides and concentrated extracts for use therein; use since Aug. 1, 1924.
411,896. Panther Oil & Grease Mfg. Co., Ft. Worth, Tex.; Oct. 21, '38; lubricating oils and greases; use since July 21, '37.
411,981. Conrad Wolff, Irvington, N. J.; Oct. 22, '38; exothermic powder for reduction and control of the formation of pipes and castings from steel ingots; use since July 6, '38.
412,053. Sic Em Mfg. Co., Norwalk, Conn.; Oct. 26, '38; scouring paste for woodwork, metals, linoleum, tile, etc.; use since March, 1934.
412,121. Vanishal Co., Spokane, Wash.; Oct. 27, '38; rug and upholstery cleaners, also hand cleanser; use since Oct. 6, '38.
412,131. General Chemical Co., New York City; Oct. 28, '38; fertilizers; use since Sept. 8, '38.
412,166. Elmer S. Hobson, New York City; Oct. 25, '38; lubricating oils and greases; use since June, 1917.
412,290. Compound Products Corp., New York City; Nov. 2, '38; anti-freeze preparation; use since Aug. 15, '38.
412,574. Wimberly & Thomas Hardware Co., Birmingham, Ala.; Nov. 9, '38; paints; use since Jan., 1935.

Two new fungicides, "Mer-Q-Ree," for use in exterior paints, and R 888 (mercury fill) for interior paints, are announced by Mer-Q-Ree, Inc., Bethesda, Md. Both are furnished in semi-liquid form and are described as easily miscible.

412,291

ARO-LINE
412,615

AROFENE
412,616

AROLITE
412,617

AROFLEX
412,618

Laboratory calgonite
412,626

PHOSPHOLEUM
412,654

HALE
412,671

LUSTRA-SAN
412,712

MARINE CHIEF
412,709

TRACTANE
412,751

ROCK
412,761

SOPANOX
412,775

FR
412,808

PARAMINE
412,847

412,856

WOOD YOUTH
412,870

WOOD LIFE
412,871

SORB
412,905

AMINOSOL
412,990

ANODEX
413,075

DU PONT
413,118

PLEXIGLAS
413,144

DRESSIT
413,148

NATURAL GRIP
413,149

Ski-boot
413,150

NOK-R-UST
413,152

ARODURE
413,160

4-CIDE
413,210

4-CIDE
413,211

FOM FOM FOM
413,340

TRICO
413,424

NOX-MOLD SPRAY
413,433

AMPOLITE
413,436

HYDROGUM
413,737

CEMENTAPRIME
413,747

TEXTOLITE
413,937

MERQREE
414,036

SUPER MARKET
414,092

K&M best in asbestos
414,264

Paraklenz
412,729

TEMP
413,065

RESWELD
413,461

412,291. Compound Products Corp., New York City; Nov. 2, '38; anti-freeze preparation; use since Aug. 15, '38.
412,615. Stroock & Wittenberg Corp., New York City; Nov. 10, '38; synthetic resins; use since Oct. 26, '38.
412,616. Stroock & Wittenberg Corp., New York City; Nov. 10, '38; phenolic synthetic resins; use since Oct. 4, '38.
412,617. Stroock & Wittenberg Corp., New York City; Nov. 10, '38; modified phenolic and other modified synthetic condensate resins; use since Oct. 3, '38.
412,618. Stroock & Wittenberg Corp., Nov. 10, '38; alkyd synthetic resins; use since Oct. 13, '38.
412,626. Calgon, Inc., Pittsburgh, Pa.; Nov. 12, '38; detergent for glassware, such as used in scientific laboratories, and other utensils; use since Oct. 1, '38.
412,654. Monsanto Chemical Co., St. Louis, Mo.; Nov. 12, '38; phosphoric acids; use since Oct. 6, '38.
412,671. Tuners Supply Co., Somerville, Mass.; Nov. 12, '38; polishes for furniture and surface finishing and refinishing preparations; use since 1885.
412,712. Mathieson Alkali Works, New York City; Nov. 14, '38; bactericide, germicide, deodorant, insecticide, and fungicide; use since Oct. 19, '38.
412,709. Wm. E. Hooper & Sons Co., Balto., Md.; Nov. 14, '38; compounds for application to cotton, wool and cellulosic and fibrous materials as protection against destructive action of abrasion, bacteria, animal life, etc.; use since Mar. 8, '38.
412,751. Anderson-Prichard Oil Corp., Oklahoma City, Okla.; Nov. 15, '38; fuel oil for tractors; use since Aug. 15, '38.
412,761. General Paint & Varnish Co., Chicago, Ill.; Nov. 15, '38; varnishes, stains, Japans, etc.; use since Mar. 15, 1889.
412,775. Monsanto Chemical Co., St. Louis, Mo.; Nov. 15, '38; compounds for preventing rancidity and/or deterioration in soap and vegetable oils; use since Nov. 2, '38.
412,808. Fink-Roselieve Co., New York City; Nov. 16, '38; photographic chemicals and preparations; use since Oct. 13, '37.
412,847. Arkansas Co., New York City; Nov. 17, '38; compound for processing textiles and fabrics; use since Jan., '36.
412,856. General Paint & Varnish Co., Chicago, Ill.; Nov. 17, '38; varnishes, stains, Japans, etc.; use since June 1, 1906.
412,870. Protection Products Mfg. Co., Kalamazoo, Mich.; Nov. 17, '38; water repellent for protection against shrinking, swelling, warping and end checking in wood; use since Nov. 2, '38.
412,871. Protection Products Mfg. Co., Kalamazoo, Mich.; Nov. 17, '38; toxic water repellent for protection against swelling, shrinking, warping, end checking, decay, blue stain, and termites in wood; use since Feb., '36.
412,905. Floridin Co., Warren, Pa.; Nov. 18, '38; agent prepared from natural earth for decolorizing or reclaiming oils for cleaning solvents; use since Sept. 10, '38.
412,990. Warwick Chemical Co., West Warwick, R. I.; Nov. 19, '38; compounds for textile processing; use since Oct. 31, '38.
413,075. MacDermid, Inc., Waterbury, Conn.; Nov. 23, '38; dry alkaline cleansing preparations; use since Sept., '38.
413,118. E. I. du Pont de Nemours & Co., Wilmington, Del.; Nov. 25, '38; automotive paint cleaners and fabric cleaning fluids; use since Jan., 1932.
413,144. Rohm & Haas Co., Phila., Pa.; Nov. 25, '38; synthetic resinous materials; use since Aug. 27, '37.
413,148. Chas. A. Schieren Co., New York City; Nov. 25, '38; dressing to condition and preserve leather; use since Oct., '38.
413,149. Chas. A. Schieren Co., New York City; Nov. 25, '38; belt dressings and leather preservatives; use since Jan., 1926.
413,150. Chas. A. Schieren Co., New York City; Nov. 25, '38; dressing to preserve and condition leather; use since Jan., '38.
413,152. Shaler Co., Waupun, Wis.; Nov. 25, '38; penetrating oils; use since Apr., '38.
413,160. Stroock & Wittenberg Corp., New York City; Nov. 25, '38; urea synthetic resins; use since Nov. 3, '38.
413,210. Durham Chemical Corp., New York City; Nov. 29, '38; insecticides; use since Nov. 10, '38.
413,211. Durham Chemical Corp., New York City; Nov. 29, '38; insecticides; use since Nov. 10, '38.
413,340. Fitzpatrick Bros., Chicago, Ill.; Dec. 1, '38; cleanser for general use having water softening properties; use since Sept., '38.
413,424. Trico Products Corp., Buffalo, N. Y.; Dec. 2, '38; glass cleaner; use since Nov. 15, '38.
413,433. Caperton Chemical Co., Daytona Beach, Fla.; Dec. 3, '38; compound for preventing and removing mold, killing moths, etc.; use since Nov. 3, '38.
413,436. Diversey Corp., Chicago, Ill.; Dec. 3, '38; cleanser for receptacles and containers, having water softening properties; use since Sept. 15, '24.
413,737. Reichhold Chemicals, Inc., Detroit and Ferndale Sta., Detroit, Mich.; Dec. 12, '38; resins; use since Nov., '38.
413,747. West Coast Kalsomine Co., Berkeley, Calif.; Dec. 12, '38; paints for priming and sealing concrete floors and walls; use since Feb., '38.
413,937. General Electric Co., Schenectady, N. Y.; Dec. 17, '38; molding compound; use since 1932.
414,036. Mer-Q-Ree, Inc., Bethesda, Md.; Dec. 20, '38; fungicides for addition to paints; use since Dec. 16, '38.
414,092. Baldwin Labs., Inc., Saegertown, Pa.; Dec. 22, '38; insecticides and compositions for exterminating insects; use since Sept. 1, '38.
414,264. Keasbey & Mattison Co., Ambler, Pa.; Dec. 28, '38; magnesium carbonate and magnesium oxide; use since Mar. 1, '38.
412,729. Paragon Oil Co., Brooklyn, N. Y.; Nov. 14, '38; glass cleaner; use since Nov. 1, '38.
413,065. Du Bois Soap Co., Cincinnati, O.; Nov. 23, '38; cleanser for vitreous, stone, metal, etc., surfaces; use since Apr. 10, '37.
413,461. Veneercraft, Ltd., London, England; Dec. 3, '38; plywood, bonded together with synthetic resin; use since May, '37.

Paper Beater Size

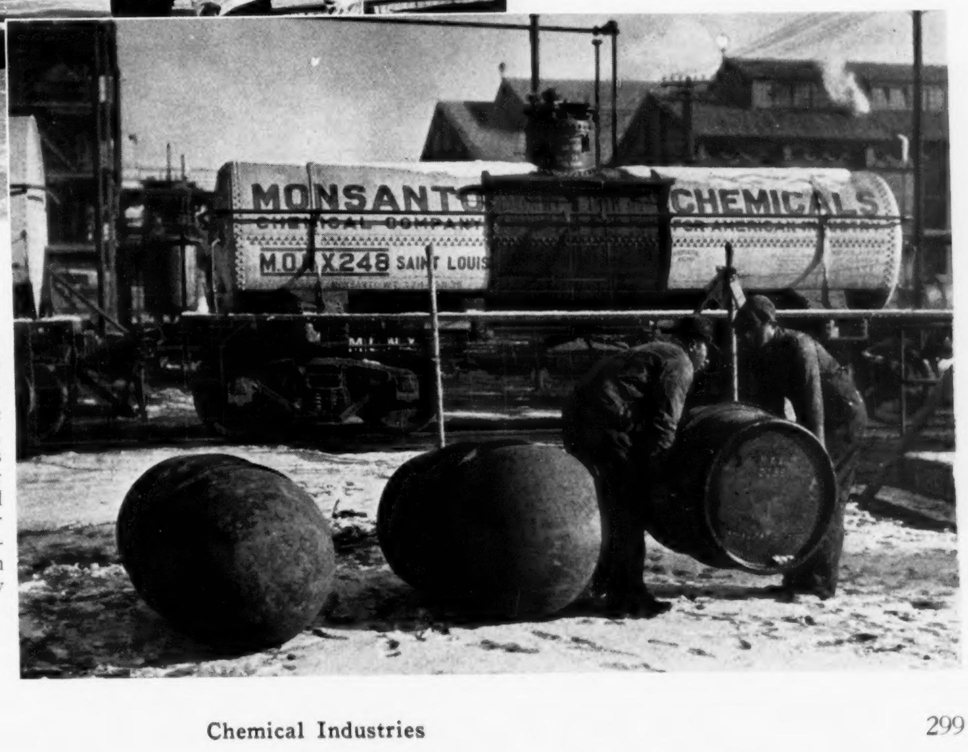
A new type of cold-water-swelling beater size known as Fiberjel "A" is being featured by the starch and dextrine division of National Adhesives Corp., Dunellen, N. J. The retention obtained from new product is as high as 85%, as compared with a top figure of 40% on the part of untreated starches, with most of this 40% being inert.

It is said to offer paper manufacturers definite improvements in finish, Mullen, folding, and tearing.

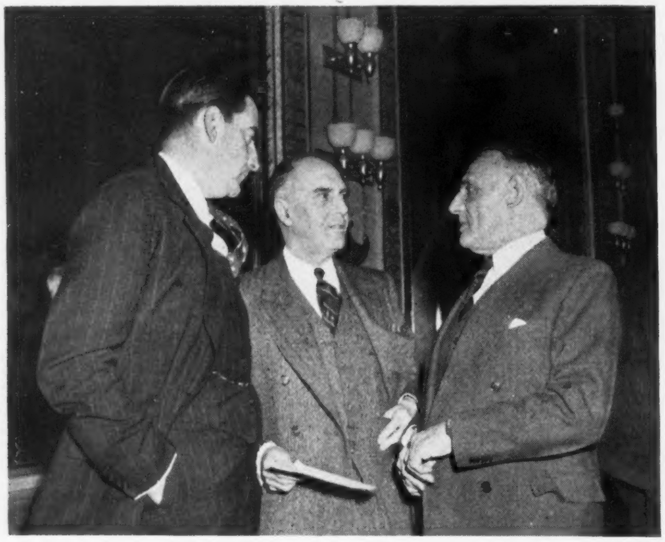

STANDARD
BICHROMATES

"Assembly Line": The automobile manufacturers may have been the first to introduce the modern "assembly line" to industrial practices, but it no longer has any monopoly on the idea. Above, production line at Allis-Chalmers Milwaukee plant, on the new type, heavy duty low-head gyratory sifters, just announced.

Health Protection: The recent disastrous earthquake in Chile brought in its wake the additional menace of disease from disrupted water supply and sewage disposal facilities. A call went out for emergency supplies of chlorine—chlorine in a concentrated, mobile form that could be flown to the stricken area. Need was quickly met with a shipment of H T H by plane to Santiago, Chile Photo, left, shows loading Mathieson Alkali's H T H into plane at Washington airport.



Steel Balloons: What happened when an explosion couldn't explode is shown in this before and after view of heavy steel shipping drums caught in a railroad fire while en route from Oklahoma to Illinois. Though puffed up like toy balloons by the terrific pressure caused by the heat, the drums were returned intact and without mishap to their owner, Monsanto Chemical, in Monsanto, Ill. The boxcar in which they were riding was completely consumed.



N. A. M. Directors: Edgar M. Queeny, president, Monsanto Chemical, and H. L. Derby, president, American Cyanamid & Chemical, snapped talking it over with Walter J. Kohler, chairman of the board, Kohler Co., while attending first '39 session of the National Association of Manufacturers' Board of Directors in New York City.

Sales Conference: J. T. Baker Chemical Company's sales representatives meet with sales manager, R. A. Clark, at the general offices of the company at Phillipsburg, N. J. Reading from left to right, first row, D. H. Coale, Warren Schumacher, Bruce Rasmussen, Stewart Cowell, G. B. Hafer. Second row, H. W. Feuchter, L. C. Fenn, Gerard Nelson, sales manager Clark, J. L. Stone. Back row, R. E. Nickelson, Webster Rice, Chas. B. Leonard, Glenn Wunderly, V. J. Wilbourn, Fisher Gaffin.

Construction: The new $2,500,000 air-conditioned, windowless plant, at Syracuse, N. Y., for the manufacture of Arm & Hammer and Cow Brand baking sodas, is rapidly taking shape.

Scoopula: New laboratory tool, perfected by Fisher Scientific Co., Pittsburgh, Pa., is handy for weighing-out material, for loosening and removing chemical salts from bottles.

Promotions: Mathieson Alkali announces promotions in executive staff. Left to right, Donald W. Drummond now in charge of sales of the carbon dioxide and gypsum products divisions; Chas. H. Larson, who is now manager of the consignment department; De Witt Thompson, who is now assistant general manager of sales, and Geo. W. Dolan, assistant to the president, who has been elected to the Board of Directors.

San Francisco Golden Gate Exposition

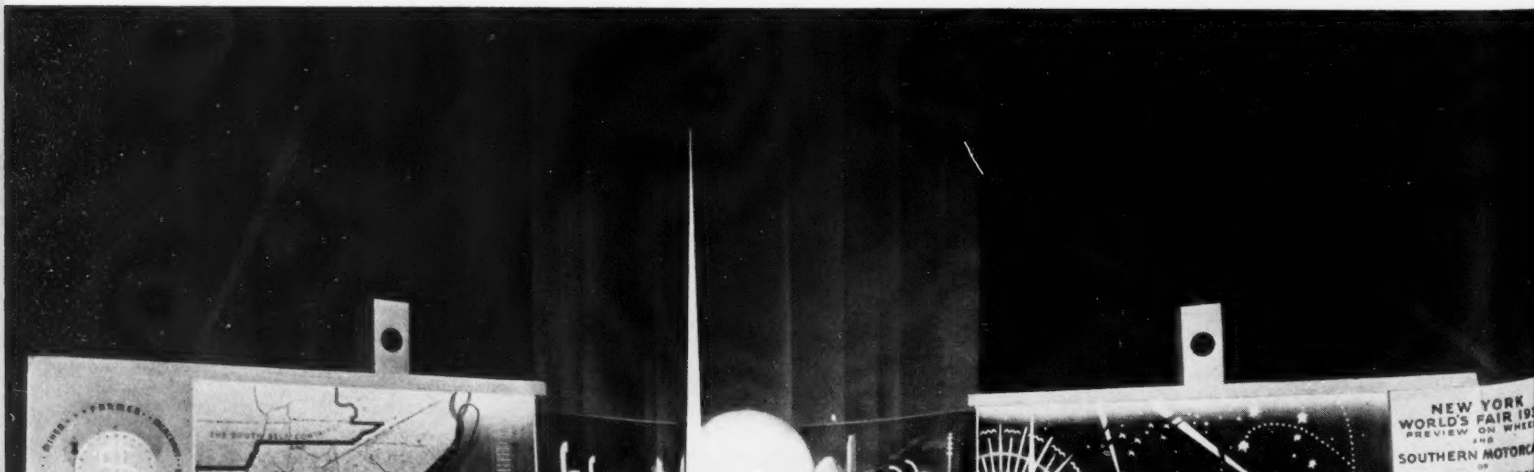
Du Pont's advertising director, William A. Hart, busily explaining a theatricalized piece of chemical apparatus, and assuring the ladies that they really do have such things in laboratories.

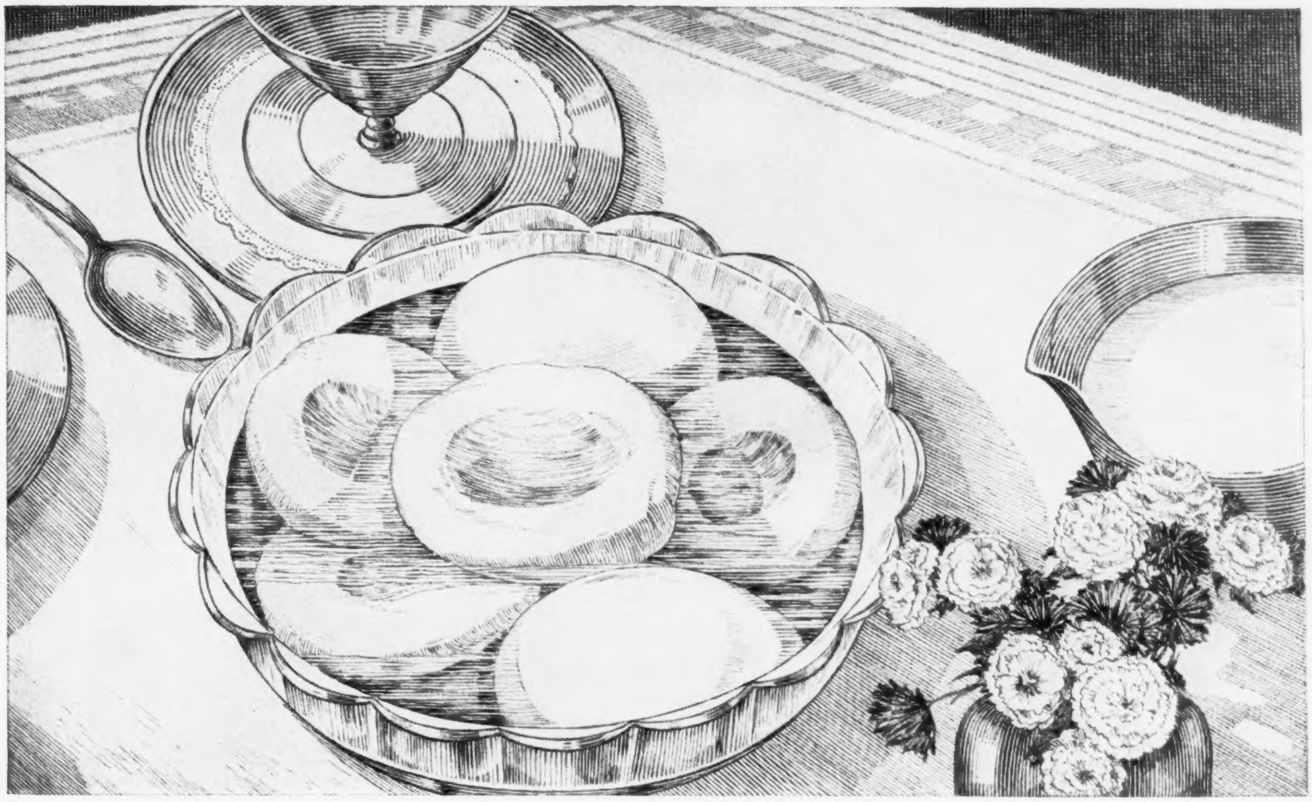
Two good reasons why the du Pont information desk was a popular spot on opening day of San Francisco's Golden Gate Exposition.

Showmanship drew 40,500 visitors to du Pont's "Wonder World of Chemistry" exhibit on opening day.

Two Fairs To See This Year

Ten thousand watts of electricity in colored floodlights make this night showing of The New York World's Fair 1939 Preview on Wheels and Southern Motorcade a spectacular sight. Consisting of two truck and trailer combinations, the Motorcade is now touring the South, under the sponsorship of The Barrett Co., distributors of Arcadian Nitrate, the American soda.





Highly Purified and Refined, with Grades Ranging from Technical to Analytical Quality...Test Quantities Will Convince You That MALLINCKRODT TANNINS Are Clearly The Solution to Your Tannin Problems. Samples and Prices Upon Request; also the Mallinckrodt Industrial-Pharmaceutical Price List.

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National Labor Relations Board Severely Criticized by Supreme Court In Fansteel Metallurgical Case—Plan To Buy $100,000,000 of Strategic and Critical Raw Materials Offered In Senate—Similar Bill Proposed In House—

The Supreme Court administered a severe verbal spanking to the N.L.R.B. on Feb. 27, rebuking it in plain, every-day language for ordering a manufacturer to reinstate with back-pay sit-down strikers who had been fined and jailed by a state court. The decision in the Fansteel Metallurgical case is expected to have far-reaching effect on future labor relationships.

Majority opinion was written by Chief Justice Hughes. The Chief Justice, supported by a court majority, did not stop with the declaration that the sit-down strike, involving seizure of private property, was "a high-handed proceeding without shadow of legal right." He went on to assert that the justification of such conduct because of the existence of a labor dispute "would be to put a premium on resort to force instead of legal remedies and to subvert the principles of law and order which lie at the foundations of society."

Chief Justice Hughes' opinion in the Fansteel case was filled with severe condemnations. "The employees had the right to strike, but they had no right to commit acts of violence or to seize their employer's plant," he said. He declared that the sit-down strike in the Fansteel plant "was illegal in its inception and prosecution." He added, "There is not a line in the statute to warrant the conclusion that it is any part of the policies of the act to encourage employees to resort to force and violence in defiance of the law of the land."

Other Supreme Court actions affecting the National Labor Relations Board dealt with on Feb. 27 were:

Refusal to review a decision by the 9th Circuit Court against the American Potash and Chemical Corp., in its effort to set aside an order directing the reinstatement with back-pay of 17 discharged workers.

Refusal to interfere with a decision permitting the board to withdraw, for further proceedings, an order against the American Cyanamid Co. and the Calco Chemical Co.

4-Year Buying Plan

A sub-committee of the Senate Military Affairs Committee unanimously reported on Feb. 24 a bill providing for a 4-year program of acquiring and storing stocks of strategic and critical raw materials necessary in time of war.

Program, if carried out, would cost $100,000,000, with an extra $2,000,000 for experimentation with production of synthetic materials not found in this country.

Bill for collecting and storing strategic materials was brought out by the sub-committee chairman, Senator Elbert Thomas, Democrat, of Utah, who said that, under the "warlike" conditions obtaining today, he thought favorable action would be taken on the bill both by the main committee and by the Senate.

Bill authorizes the expenditure of $25,-000,000 annually for 4 years for the acquisition of materials in two categories, strategic and critical. Those called strategic are "those materials essential to the national defense for the supply of which in war dependence must be placed in whole or in part on sources outside the continental limits of the U. S. and for which strict conservation and distribution control measures would be necessary."

While the bill would create a commission composed of the Secretaries of State, War, Navy and Interior to determine what materials should come under this heading, and under the heading of critical materials, nevertheless the committee has received advices from experts of these departments on what materials are likely to be considered critical. In its report it lists 17 strategic materials and 20 critical materials.

Among the strategic materials are aluminum, antimony, chromium, cocoanut shell char, manganese, mica, nickel, quartz crystal, quicksilver, quinine, tin and tungsten.

Of these, the great majority are such that the U. S. depends almost entirely on foreign sources. Mica, mercury and tungsten are produced in the U. S., but the supply is regarded as so inadequate as to require considerable draft on foreign sources.

In a somewhat similar bill, Rep. Francis H. Case, Republican, (S. D.), makes the requirement that, out of the $25,000,-000 which his bill authorizes annually for purchase and storage of strategic materials, at least $500,000 must be invested in tin and $5,000,000 in manganese. A $1,000,000 a year authorization for the Bureau of Mines and Geological Survey to develop domestic stocks is also included in the measure.

Critical materials, in the Senate bill, are defined as "those materials essential to the national defense, the procurement problems of which in war, while difficult, are less serious than those of strategic materials, because they can be either domestically produced or obtained in more adequate quantities or have a lesser degree of essentiality, and for which some degree of conservation and distribution control will be necessary."

Among the products listed in this group are: asbestos, cadmium, cryolite, flaxseed, fluorspar, graphite, iodine, nux vomica, opium, phenol, and picric acid, platinum, scientific glass, tanning materials, titanium, toluol and vanadium.

Improved Outlook in Manganese

Solution of one of America's most knotty defense problems, the procurement of manganese for steel manufacture in war-time, was seen as being a step nearer following publication recently of the annual report of the Freeport Sulphur Co. Report revealed Freeport's subsidiary, the Cuban-American Manganese Corp., had been successful in reducing costs to the point that the company is now able to compete with foreign manganese producers despite the fact world prices are at virtually dump levels. Report was signed by Langbourne M. Williams, Jr., president.

In the report Mr. Williams said that "because of disturbed world conditions, especially European tension involving the Ukraine and the Mediterranean region, the American government and steel manufacturers are greatly concerned about the dependence of the United States upon such distant sources for this essential mineral.

"Against this background, the availability of manganese from our supplies in Cuba is of strategic importance to the steel industry of America," the report continued. "The company now has in storage approximately 75,000 tons of high-grade ore suitable for the manufacture of ferromanganese and, in addition, has 25,-000 tons of low-grade manganese to care for the needs of customers for this product."

Swiss Fair Opens

From March 18 to 28, '39, Switzerland will have her 23rd Swiss Industries Fair, at Basle, the largest display of her renowned quality goods, of new designs and new inventions. This year's Fair should prove of particular interest to foreign visitors, as the Fair will be principally devoted to export trade. Twenty-one groups of industry will exhibit their products, such as Machinery, Electricity, Textiles, Food, Dyes, Chemicals, etc. Full information on any Swiss lines are obtainable from the Consulate General of Switzerland, 444 Madison ave., N. Y. City.

Granted Tax Exemption

The American Cyanamid & Chemical Corp., which has practically completed construction of a $250,000 plant at Mobile, Ala., has been granted a 10-year exemption from county ad valorem taxes by the County Commission.

Roosevelt Writes New Conservation Message

Asks Legislation To Conserve Coal, Oil, Gas and Water Power—Monopoly Committee Seeks Data On Sulfur, Steel, Etc.—T. V. A. May Get New Commercial Size Blast Furnace—

President Roosevelt urged Congress on Feb. 16 in a special message to enact legislation to conserve the nation's coal, oil, gas and water power, which, he said, were being consumed more rapidly than in any other country, notwithstanding the warning of scientists that there would be a progressively increasing demand for energy for all purposes.

Mr. Roosevelt's recommendations were set forth in two special messages, one transmitting an exhaustive report of the National Resources Committee, and the other proposing the creation of a central technical agency to integrate a Federal-state program to end water pollution.

Envisaging a shortage of oil supply within a decade or two sufficiently serious to cause a sharp increase in price, the committee report recommended establishment of a Federal oil conservation board or commission to draft regulations for production and distribution of oil and gas with a view to preventing waste.

The committee recommended also strict regulation of the bituminous coal industry and a co-ordinated Federal program for development and conservation of petroleum, natural gas, high-grade coal and electric energy.

President Roosevelt recommended that before undertaking a Federal aid program, which he estimated would cost $2,000,000,000 over the next 10 or 20 years, Congress establish an agency to coordinate research and enforcement. In such a Federal aid system, he argued, the Federal government should take the leadership, although the responsibility for ending pollution of streams rested primarily on municipal governments and private industry.

Only '39 Funds Planned

One significant development of the month was the proposal to limit funds of the Temporary National Economic Committee, better known as the Monopoly Committee, so that it will have only sufficient resources to continue through '39. The administration is said to be in sympathy with this proposal in order to have a check on the committee's activities. With a new policy of "appeasement," it is easy to see why New Deal leaders might want to keep the committee in line.

The Temporary National Economic Committee resumed hearings on Feb. 28. The Federal Trade Commission will present an analysis of its experience in administering the statutes affecting business and industry under which it exercises its jurisdiction. Among the industries expected to be subject to analysis during the hearings are the following: sulfur, steel, and rubber.

Fertilizer Investigation

The Department of Justice, it is reported, is about to start a nation-wide investigation of the commercial fertilizer industry with a view to breaking up any price-fixing combines which may be found to exist. In reality, the investigation has been pending for some time, but it now appears the Department is again becoming active on the matter.

Exports Held Up Well

U. S. exports of chemicals and related products were well maintained in '38, particularly chemical specialties, industrial chemicals, fertilizers, crude drugs, medicinals and toiletries, according to the Commerce Dept.'s Chemical Division.

Exports of such products were valued at $158,500,000 during the year, compared with $180,700,000 in '37, $153,400,000 in '36, and $107,000,000 in '33.

Exports of chemical specialties, a group which includes such products as plastic materials, polishes, insecticides, disinfectants and similar materials, were well maintained at a value of $28,953,000 in '38, compared with $27,526,000 during the preceding year.

Exports of industrial chemicals, not including sulfur, were valued at $25,000,000 during the year, against $27,505,000 in '37, the decline being due largely to smaller shipments of sodium compounds, the value of which aggregated $10,417,000 in '38, against $12,010,000 during the preceding year. Exports of all grades of sulfur declined in value from $12,089,000 in '37 to $10,802,000 in '38. In quantity, shipments of crude sulfur declined from 644,005 to 575,957 tons and refined sulfur from 29,669,000 lbs. to 28,463,000 lbs. during these periods.

Exports of fertilizers recorded little change in '38 compared with 1937, either in quantity or the value received. Shipments during the year aggregated 1,568,575 tons valued at $16,531,000, against 1,521,000 tons valued at $16,954,000 in '37.

Naval stores exports declined sharply in '38 to a total value of $12,329,000 from $22,141,000 during the preceding year, due both to smaller shipments and to lower price levels. During these periods shipments of rosin to foreign markets declined from 1,028,530 bbls. to 847,000 bbls., turpentine from 13,610,000 gals. to 10,655,000 gals., and pine oil from 1,730,200 gals. to 1,523,000 gals.

Other items and classifications on the chemical and related products export list recording declines in '38, compared with the preceding year, included vegetable tanning extracts, exports of which declined in value from $1,754,300 to $1,328,600; coal-tar products from $14,877,550 to $9,890,500; essential oils, from $2,647,000 to $2,368,000; pigments, paints and varnishes from $21,544,000 to $18,654,600; soaps, from $3,200,500 to $2,797,000; and printing inks, from $1,037,600 to $967,000.

Restore Furnace Appropriation

The item of $450,000 in the Independent Offices Appropriation Bill for the construction of a commercial-size blast furnace by the TVA for the production of phosphate for fertilizer use was restored to the bill following the meeting of the conference members late in February. The bill now goes back to the House and the Senate.

Fire on Feb. 11 destroyed a portion of General Chemical's East St. Louis plant. Damage was estimated at $50,000.

COMING EVENTS

American Petroleum Institute, Division of Production, Southwestern District, Plaza Hotel, San Antonio, Tex., March 16-17.
Oil Trades Association of New York, Annual Meeting, Waldorf-Astoria, New York City, March 21.
American Chemical Society, Akron Rubber Group, Akron, Ohio, March 24.
National Farm Chemurgic Conference, Jackson, Miss., March 29 to April 1.
American Chemical Society, Spring Meeting, Baltimore, Md., April 3-7.
Southern Textile Exposition, Greenville, S. C., April 3-8.
American Ceramic Society, Annual Meeting, Hotel Stevens, Chicago, week of April 16.
American Society Biological Chemists, Toronto, Ont., Canada, April 26-29.
Electrochemical Society, Spring Meeting, Deshler-Wallick Hotel, Columbus, O., April 26-29.
American Oil Chemists' Society, Jung Hotel, New Orleans, La., May 5-6.
American Institute of Chemical Engineers, Akron, Ohio, May 15, 16, 17.
National Association of Purchasing Agents, San Francisco, Hotels Fairmont and Mark Hopkins, May 22-25.
American Association of Cereal Chemists, Kansas City, Mo., May 22-26.
American Water Works Association, 59th Annual Convention, Atlantic City, N. J., Hotels Ambassador and Chelsea, June 11-15.
American Pulp & Paper Mill Superintendents Association, Washington, D. C., Wardman Park Hotel, June 13-15.
American Electro Platers Society, Asbury Park, N. J., June 19-22.
A. C. S., Symposium of Division of Physical and Inorganic Chemistry—Joint Symposium with University Wisconsin, Madison, Wis., June 20-22.
American Society for Testing Materials, 42nd Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, June 26-30.
16th Colloid Symposium, Division of Colloid Chemistry, Stanford University, Calif., July 6-8.
American Mining Congress, Sixth Annual Metal Mining Convention & Exposition, Western Division, Salt Lake City, Utah, August 28-31.
National Safety Congress & Exposition, Atlantic City, N. J., October 16-20.
American Public Health Association, William Penn Hotel, Pittsburgh, Pa., Oct. 17-20.
National Paint, Varnish & Lacquer Association, Annual Convention, Hotel Fairmont, San Francisco, November 1-3.
A. C. S., Eighth National Organic Chemistry Symposium, Division Organic Chemistry, St. Louis, Mo., Dec. 28-30.

Local:

Pittsburgh Section, A. C. S., March 16.
N. Y. Section, A. C. S., Joint Meeting, Society Chemical Industry in charge, Chemists' Club, N.Y.C., April 7.

Chlorine Tankcar Price Again Reduced

Keen Competition Forces 25c Drop to $1.75—February Business Failed to Expand Seasonally As Much As Expected—Mannitol Offered At Lower Price—March Outlook Promising—

Heavy Chemicals

Price-wise the most important development in the past month was fresh weakness in quotations for chlorine in tankcar and multiple tankcar units. Severe competition forced a 25c reduction. On the latest basis, single unit tankcars are quoted at $1.75, freight equalized, and multiple units at $1.90. The downward revision in the tank schedule, the second in the past two months, brings quotations to the lowest level since '33. Producers are hopeful that the latest decline will bring about a more stabilized market and ease the competitive pressure. The cylinder price structure was not affected by the reduction in tankcar quotations.

Aside from the chlorine situation, the past month witnessed very little in the way of price revisions. Certain of the tin derivatives were slightly higher when the metal firmed up. A ½c decline was announced early in the month in the price of sodium antimoniate and the new quotations start at 11½c.

Volume Below Expectations

February volume of industrial chemicals was somewhat disappointing to producers and distributors. In the last half of January the need for inventory replacement caused a healthy expansion in the number of shipping orders released and in spot purchases. It was expected that normal seasonal expansion would follow in February, but instead, a somewhat quieter tone was in evidence. When comparison is made with the same month a year ago, however, the volume seems quite satisfactory, being probably about 15% ahead of February of last year.

While the slight let-down was a bit disconcerting, it was viewed as likely to be strictly of a temporary nature. In most quarters it is looked upon as a breathing spell. March is usually one of the best months in chemical tonnage, and several of the heavy consuming industries are expanding operating schedules.

A good demand was in evidence for the principal plating chemicals, including the cyanides, nickel salts, and chromic acid. Still further improvement is anticipated with the automotive manufacturers announcing definite expansion plans in production schedules to be put into effect by March 15. A fair volume of alkali business was reported. Bichromate shipments to the tanning and dry-color fields were said to have shown seasonal betterment. Routine demand was in evidence for the principal mineral acids. Weather conditions were a definite aid in boosting calcium chloride sales. Considerable tonnage of copper sulfate has already been placed for agricultural purposes.

The keen competition between domestic and imported sodium silicofluoride continues, but no price changes were announced in the past 30 days. Competition in sodium tetrapyrophosphate has eased considerably with the close of the contract season.

Mannitol Price Lowered

Increased production and use of mannitol are the reasons behind still another price reduction in this product. The reagent grade is now quoted at $1.10 per lb., cases, 50 lbs. each, while in 100-lb. lots the price is 5c less. The commercial grade is now quoted at 57c in barrels of 250-lbs. each, and in ton lots at 46c per lb., all prices being f.o.b. works. The change in the usage of mannitol from that of a laboratory reagent to that of an industrial chemical has been a very interesting development and illustrates the general trend in the chemical industry. By successively reducing the price new uses are introduced, larger production becomes possible and the consumer is the definite beneficiary of such a policy.

New Phosphate Announced

A new plant has been opened for the manufacture of sodium tetraphosphate, by the Rumford Chemical Works at Rumford, R. I. First operations were shown to the stockholders at their recent annual meeting in Rumford.

Plant is unique not only in being the only one in the U. S. for the manufacture of "tetra," but also in mechanical and architectural features, according to A. E. Marshall, president. This chemical is increasingly used as a water-softener, in cleaning compounds, and an essential aid in drilling oil wells, and has been meeting steadily increasing demand. One of its domestic uses is its ability to eliminate "rings" in bathtubs.

Manufacture is a process of evaporating to dryness a solution of orthophosphates and heating the resulting mixture to quiet fusion at a bright red heat. The fused material, sodium tetraphosphate, is slowly cooled in a continuous stainless steel cooler,—stainless steel being also used extensively in other parts of the plant. The small glassy beads are then ground to pass a 20 mesh screen.

The building has been designed so that the exterior walls cover and outline the interior machinery, giving it a strictly functional appearance. The entire process is automatic and continuous.

Important Price Changes

	Feb. 28	Jan. 31
ADVANCED		
Stannous chloride, anhyd.	$0.44	$0.43½
Tin crystals	.36	.35½
DECLINED		
Chlorine, tanks	$1.75	$2.00
multiple units	1.90	2.15
Sodium antimoniate	.11½	.12

Sodium tetraphosphate has the ability to segregate calcium compounds when they are present in water. Hence "tetra" softens water, provides a soothing bath, eliminates rings on the bathtub, and is valuable in dishwashing preparations. Water thus softened remains perfectly clear. Its other large use, in drilling oil wells, derives from its ability as a deflocculent to maintain the drilling mud in fluid condition—mud being the lubricant used in deep drilling operations.

Celebrating 80th Birthday

This year the Rumford Chemical Works celebrates the 80th anniversary of the manufacture of baking powder, the company's chief product.

Mathieson Promotions

Mathieson Alkali has announced several promotions made in executive and sales personnel:

At the January meeting of the board of directors, George W. Dolan, assistant to the president, was made a member of the board. Until recently Mr. Dolan has also held the title of assistant general manager of sales. He has now relinquished this position, however, in order to devote full time to his executive duties as assistant to the president.

Into the vacancy thus created, De Witt Thompson, formerly manager of the company's consignment department, has been promoted to the position of assistant general manager of sales, while his former assistant, Charles H. Larson, succeeds to the position of manager of the consignment department. At the same time, Donald W. Drummond, who has been assistant to Mr. Dolan in the carbon dioxide and gypsum products divisions, has been placed in charge of sales of these two divisions, the products of which are marketed in the southeastern and southwestern states.

Other sales executives making their headquarters in N. Y. City are J. A. Kienle, vice-president-director of sales; E. E. Routh, general manager of sales; Robert J. Quinn, assistant general manager of sales; and J. B. Peake, N. Y. district sales manager.

News of the Specialties

Oakite Celebrates 3 Decades of Service

Well-Known Detergent Manufacturer Issues Special Number of House Organ—Committee for Testing of Textile Finishes Named—NAIDM Distributing '39 Official Test Insecticide—

Adolph Scholler Dies

Adolph Scholler, 55, vice-president and treasurer, Scholler Bros., Philadelphia, manufacturer of textile chemical specialties, died on Feb. 12. He was in charge

ADOLPH SCHOLLER

of the company's technical department. Mr. Scholler was active in the affairs of the A. A. T. & C.

The Scholler Bros. Company was established in '07 by the late Henry H., Adolph and Fred Scholler. Surviving, in addition to Fred Scholler, is Ida M. Scholler, a sister.

Allen Bill Introduced

Agricultural poisons represented as effective as insecticides or fungicides would be required by the Allen bill (A. 584) to be clearly and plainly labeled to show the name and percentage amount of each active ingredient and the total percentage of all inert ingredients. Bill has been introduced into both houses of the N. Y. State Legislature. The label would also be required to give the name and address of the manufacturer.

The Allen bill also would prohibit the sale of agricultural poisons which were not up to the represented standard of quality or did not contain the stated active ingredients and which, if intended for use on vegetation, contained any substance injurious to vegetation except weeds. The prohibition would apply also to falsely or misleadingly labeled substances.

The bill applies, in addition to insecticides and fungicides, to bactericides, weed-killers, rodent-killers, and other agents represented as effective in combating plant or animal pests.

Alrose in Larger Quarters

Alrose Chemical, Providence, R. I., manufacturer of textile chemical specialties, is now in an enlarged plant at 180 Mill st., Cranston, R. I.

Commemorating 3 decades of service to industry as originators and producers of industrial cleaning methods and materials, Oakite Products, Inc., 22 Thames st., N. Y. City, has just released a special issue of its house organ, *Oakite News Service*.

This special issue gives an interesting, historical review of the development of specialized cleaning methods and materials, and how they have contributed in helping American industry speed production and keep manufacturing costs low. It includes, too, a recital of the trends industrial cleaning research will follow in the coming years. Free copies are available upon request.

Marking of the Company's 30th anniversary will be appropriately climaxed a few months hence, when an attractive, two-color brochure will be issued, dramatically presenting in pictorial form the economic contribution made by many different industries to the nation's progress.

Committee on Finishes Named

The Special Committee for Testing of Textile Finishes announces appointment of L. B. Arnold, Jr., chairman, Miss Elizabeth Weirick and H. J. Ball as its directing committee. Advisory Members are W. D. Appel and K. H. Barnard.

The Special Committee for Testing of Textile Finishes was organized on Jan. 26 under the sponsorship of Committee D-13 on Textile Materials of the American Society for Testing Materials. The research program of the committee will be carried out by its own research associate at the National Bureau of Standards. It will emphasize methods for the physical evaluation of the "handle" of textiles and will include test methods for certain other types of textile finishes.

'39 Official Insecticide Test

The National Association of Insecticide and Disinfectant Manufacturers, N. Y. City, is distributing the '39 Official Test Insecticide. The '39 test insecticide will be good for use to Feb. 1, '40. The '39 test insecticide is packed six 6-ounce bottles to a case and single 6-ounce bottles in individual mailing containers. The test shall be conducted in accordance with the current Peet-Grady test procedure, and must show an average skill for the official insecticide to lie within the range between 30 and 70% kill.

F. T. C. News of the Month

The Federal Trade Commission has issued a complaint charging three former employees of the manufacturer of an automobile cleaning and polishing product, who have organized a rival company, with misrepresentation and disparagement of the product they once sold.

Mathew W. M. Devitt, Roy D. Schlegel and Robert E. Sargent, trading as Autogroom Company, with offices at 11 E. 44th st., N. Y. City, and 5013 Georgia ave., N. W., Washington, D. C., and a manufacturing plant in Long Island City, N. Y., were once connected with the manufacture and sale of Karsmetik, an automobile cleanser and polisher, which still is being manufactured and sold, it is alleged.

Complaint charges that the respondents, through acquaintance and familiarity with purchasers of their former product, defamed and disparaged it to prospective purchasers of their own product, Autogroom, by alleging that the company manufacturing Karsmetik is no longer in business; that the product is not being offered for sale; that the chemist who discovered the formula for, and supervised the preparation of, Karsmetik is now in the employ of the respondents, and that the product Autogroom is, in all respects, the same as the product Karsmetik.

The complaint alleges that the company manufacturing Karsmetik has not discontinued business; is now manufacturing and offering it for sale in the same trade territory in which the respondents operate; that the respondents do not have in their employ the chemist who discovered the formula for Karsmetik and that the product Autogroom is not in all respects the same as Karsmetik.

Sargent with Laurel

W. R. Sargent has been appointed sales representative for Laurel Soap Mfg. Co., Philadelphia. Company makes textile soaps, oils and finishes. Mr. Sargent will work in conjunction with A. Henry Gaede whose headquarters are in Charlotte, N. C.

Gulick in New Posts

C. P. Gulick, chairman of the board of National Oil Products, Harrison, N. J., has been elected president of the N. J. Social Hygiene Association. He is also president of the West Hudson Manufacturers Club.

Harscher Joins Keystone

Frank Harscher, associated with the dry-cleaning industry for the past 30 years, has joined the sales staff of the Keystone Aniline & Chemical Co., Chicago.

Naphthalene Refiners Report Good Seasonal Volume

Slight Decline in Consumption of Coal-Tar Solvents—Cresylic Competitive—Pyridine Firm—Phenol Shipments Heavy to Plastics Field—Dye Sales Hold Up Well—Coke Output Up—

Coal-tar Chemicals

Conditions in the coal-tar chemical field were somewhat irregular in the past 30 days. Instead of expanding seasonally, a slight contraction in the volume was noticeable in the final half of the month. Prices, however, held firmly in practically all items. Some weakness was reported early in the period under review in imported cresylic and in imported crude naphthalene. Domestic producers of both of these items, however, held quotations at unchanged levels.

Pyridine was a firm spot in the market. Shipments of phenol were in good volume with an encouraging quantity going to the synthetic resin producers. Trading in creosote oil was only fair. Manufacturers of disinfectants were reported to have made sizable purchases of cresylic in preparation for their active spring selling season.

A slight decline in the demand for the principal coal-tar solvents was due to the hesitancy in the automotive and rubber manufacturing centers. This condition was viewed as temporary. Coatings manufacturers expect a quick change in this situation. Interest in benzol was well sustained, but buyers were inclined to hold commitments and shipping instructions down to immediate needs.

Producers of refined naphthalene are in their busy season, and already considerable stocking of jobbers has taken place. A fair demand was still in evidence for crude, but refiners generally have contracted for just about all the material they will need for the first half of the year. Imported crude was off slightly in price, but actually very little material changed hands in the past 30 days.

A fairly consistent demand was reported for the coal-tar colors. Dye makers, however, have slowed up production slightly, with the result that interest in many of the important intermediates has declined. In general, the volume of business in intermediates in February was below the January figure, even when allowance is made for fewer number of working days in the former month. The volume was decidedly better than in February a year ago.

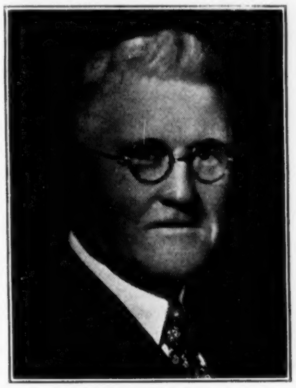
While steel operations have so far failed to reach 60% activity, there is every indication that improvement can be looked for in the next 2 or 3 weeks. This means higher coking activity in the near future. There now appears to be little chance of any serious shortage of coal-tar crudes or solvents.

Output of byproduct coke for January amounted to 3,366,956 tons, an increase of 4,111 tons, or 0.1%, when compared with December recovery. December output was 3,362,845 tons, while only 2,762,474 tons were reported in January of '38.

January benzol production was 7,788,000 gals., a loss of 0.2% from the 7,802,000 gals. made in December. Production in January, '38, totaled 6,155,000 gals.

Deaths of the Month

George W. Goudy, 69, general representative, foreign manager and director of Philadelphia Quartz, on Feb. 7, at his home in Highland, Ulster County, N. Y. He had been associated with the company over 40 years, having first served in the capacity of a salesman, assisting his father, Charles W. Goudy, who was



GEORGE W. GOUDY

traveling representative. His early experience as a soap manufacturer well fitted him for the position of aiding his father in validating the merits of silicate of soda, particularly in the manufacture of soap and paper.

Through more than 40 years of business life with the company, he saw the development of wider usefulness of the sodium silicates and, in the early 20th century, contributed greatly to the establishment of the fiber box as a standard shipping container.

His kindly philosophy and keen wit endeared him to all who knew him. A favorite motto in dealing with others was, "Is it kind? Is it so? Is it worth while?" His advice was constantly sought by friends in and out of business circles, and so he became "Uncle George" to a great number of people from Coast to Coast, in Europe, in South America and across the Pacific.

Frederick J. Kenney

Frederick J. Kenney, 60, a chemist who served 41 years in various city departments, retiring in '35 as chief chemist of the central testing laboratory of the Dept. of Purchase, died Feb. 23, in Daytona Beach, Fla., of a heart ailment.

Important Price Changes

	Feb. 28	Jan. 31
ADVANCED		
None		
DECLINED		
Acid cresylic, imp.	$0.60	$0.62
Naphthalene, crude, imp.	1.50	1.60

Born in N. Y. City, he studied at Columbia University and entered the service of the city as a chemist with the Dept. of Charities in 1894. In 1904 he became a chemist in the Dept. of Health. In '20 he was made chief chemist in the Dept. of Purchase.

Since his retirement, he had lived at Hewlett, L. I., and devoted most of his time to the Chemists' Club. He also had acted as consultant to private firms.

Elam Cross Curtis

Elam Cross Curtis, 45, assistant superintendent of Mathieson Alkali's plant at Niagara Falls, died on Feb. 18. He was graduated from Syracuse U. with an A. B. in chemistry in '24 and was employed by Semet-Solvay, of Syracuse, from '17 to '21, and by the Atmospheric Nitrogen Corp. from '21 to '25 in an executive capacity in the ammonia operations at Syracuse. He came to Mathieson in '25 as assistant superintendent of the ammonia plant at Niagara Falls. In '29 he became superintendent of the ammonia plant and since '31 has been assistant general superintendent.

He was active in professional organizations, including the A. C. S., the A. I. Ch. E. and the Electrons Club. His fraternal affiliations were with the Masonic order and Phi Gamma Delta Fraternity. He was also a committeeman in one of the local Boy Scout troops, and a member of the Geology Club of the Buffalo Museum of Science.

An Authority on N. Y. Geology

Mr. Curtis was an enthusiastic hobbyist whose interests included geology, philately, ornithology, entomology, philology, books and astronomy. At one time his collection of insects was on display at the Buffalo Museum, and he gave several talks on his hobbies before various organizations. He was considered an authority on the geology of Western New York.

Dr. Charles A. Ernst

Dr. Charles A. Ernst, 67, a pioneer in rayon, one of the founders of American Viscose, on Feb. 1, following a short illness. In '11 he became chief chemist of the company, in '21 he was elected to the presidency, and retired in '25.

Fine Chemicals

Mercury "Skyrockets" to $90 a Flask

Hard Mercurials Advanced—Good Demand For Seasonal Items—Ascorbic Acid Reduced—Sulfanilamide at $1 a lb.—Trading In Aromatics Quiet—Rasmussen Promoted—

Important Price Changes

	Feb. 28	Jan. 31
ADVANCED		
Calomel	$1.44	$1.36
Corrosive sublimate, cryst.	1.26	1.20
granular	1.11	1.05
Mercury	90.00	80.00
oxide, yellow, U.S.P.	1.93	1.83
Red precipitate, N.F.	1.71	1.61
White precipitate	1.66	1.56
DECLINED		
Acid ascorbic	$2.75	$3.00
Cocoa butter	.11¼	.11¾
Deglycol laurate	.16	.23
oleate	.13	.20
stearate	.24	.28
Sulfanilamide	1.00	1.25

The sharp rise in mercury was easily the outstanding news of the last 30 days in the fine chemical markets. Several advances in both domestic and imported were made and at the month-end the former was being quoted at $90-93 per flask while importers were asking $74 per flask in bond, which is about equivalent to $93.50 per flask duty paid. There was considerable talk in the New York market that before long foreign metal prices would reach the $100 mark or possibly higher on spot deliveries. It is reported that most of the domestic output has been spoken for for several months ahead and that basically this is the main reason for the special price strength and the bullish feeling over the immediate future.

The hard mercurials were advanced in price during the past month. Calomel reached $1.44, a gain of 8c per lb.; corrosive sublimate was up 6c, to a basis of $1.26 for crystals and $1.11 for granular. Yellow mercury oxide, U.S.P., was raised 10c and is now quoted at $1.93. Increases of 10c each were also placed in effect for both red precipitate, N.F., and white precipitate, the former now being held at $1.71 and the latter at $1.66. With the metal exhibiting every promise of advancing even still higher, the trade generally expects higher prices for all of the mercurials.

On the downward side of the market ascorbic acid was reduced 25c per oz., to a basis of $2.75 to $3.00, according to quantity. Sulfanilamide once more was lowered, a drop of 25c making the new market one dollar per lb. With demand at a low ebb suppliers of cocoa butter revamped price schedules and a ½c reduction brought the carlot price to 11¼c for spot delivery and 11.15c for March deliveries.

Seasonal Items Move Fast

During the past month there was a steady demand for winter seasonal items, such as acetylsalicylic acid, codeine, morphine, etc. While the wave of colds, grippe and mild influenza could hardly be classed as being of epidemic proportions, there has been quite a little illness and considerable replacement purchasing of certain items has more or less been a feature of the market for the past 30 days.

The tartars were unchanged in price during the past month, but the firmness which has prevailed in this group for several months continued without change. The demand for citric was about normal for this period of the year and the price was unchanged. Demand for the bismuth salts was reported as being satisfactory. Certain of the bromides were said to be moving in fairly sizable quantities.

The current volume in specially denatured formulas of alcohol was encouraging, according to producers and the price structure appeared to be somewhat firmer. The treasury department has revoked 8 S.D. formulas that were little used in '38 and has modified formulas 23F and 29. A fairly active market was reported in glycerine and the market had a steady undertone.

Aromatic Prices Firm

In the aromatic chemical field the volume was generally reported as being satisfactory, with prices holding firm for practically all important items. Vanillin is not quite so competitive. March volume of fine chemicals is expected to show some seasonal increases over February.

Baker Promotes Rasmussen

H. B. Rasmussen has been appointed manager of the Chicago office of J. T. Baker Chemical Co., Phillipsburg, N. J. Mr. Rasmussen has been associated with the Baker organization for 5 years as a district representative, traveling in Michigan and Indiana. Although he will make his new headquarters in Chicago, Mr. Rasmussen will continue to serve his customers in the Michigan-Indiana territory personally. The Baker company, manufacturer of a wide line of C. P. chemicals, acids, and pharmaceuticals, also maintains branch offices in N. Y. City and Philadelphia.

S. & B. Appointed Sales Agent

Scott & Bowne Vitamin Corp., Bloomfield, N. J., has been appointed U. S. and Canadian sales agents for the natural B_2 (riboflavin), and natural B_1 vitamin material manufactured by the Borden Co., N. Y. City.

Etman Dies at 60

Louis D. Etman, 60, purchasing agent for the drug, chemical and proprietary medicine dept. of Gilman Brothers, Inc., wholesale druggist, Boston, died unexpectedly Feb. 16.

Born in New Lebanon, N. Y., Mr. Etman, who was a registered pharmacist, started in the retail drug business with R. E. Willard & Son, Boston, and later joined Schieffelin & Co. as general representative, covering most of New England. He left Schieffelin in 1917 after 11 years' association and joined the former firm of Powers-Weightman & Rosengarten, being associated as export manager for the N. Y. office. When Merck & Co. absorbed Powers-Weightman & Rosengarten, Mr. Etman resigned to join J. T. Baker Chemical Co. as manager of its N. Y. office. He resigned from the Baker company in '32 to become affiliated with Gilman Brothers, Inc. He was prominent at one time in the affairs of the Chemical Salesmen's Association of the American Chemical Industry.

A.C.S. at Baltimore, April 3-7

Fifteen symposia reporting advances in scientific research and in the application of chemistry to industry, medicine, agriculture, and food, engineering, and public health will be outstanding events of the 97th meeting of the A.C.S., which, it is announced, will be held in Baltimore April 3 to 7.

Several thousand chemists, industrialists, educators, officials of state and federal services, and representatives of other fields will participate. Dr. J. C. W. Frazer, Baker professor of chemistry at Johns Hopkins, has been appointed honorary chairman of the meeting. Dr. John C. Krantz, Jr., professor of pharmacology in the Medical School of the University of Maryland, has been named general chairman.

Seventeen of the 18 professional divisions of the Society, of which Prof. Charles A. Kraus of Brown is president, will hold sessions. The convention will formally open on Monday, April 3, with a meeting of the Society's council, followed at 2 p. m. by a public meeting in the Polytechnic Institute Auditorium. Many group events, including visits to the industries, educational institutions and points of historic interest in Maryland, will supplement the convention program.

Haynes Speaks at Yale

Williams Haynes, editorial director of Chemical Industries, spoke before the Yale chemical students on Feb. 18.

Solvent Consumption Rises Seasonally

Mesityl Oxide Reduced Sharply—Quotations on Mixed Amyl Chlorides Revised—Tricresyl Phosphate Schedule Simplified—Firm Tone In Petroleum Solvents—Alcohol Steady—

Solvents and Plasticizers

The markets for solvents and plasticizers passed through an uneventful period in the past 30 days. Consumption was greater when comparison is made either with January totals or with the figures for February a year ago. A slightly steadier price tone was also in evidence, but competition is still extremely keen in many items.

Coatings makers are taking larger quantities of solvents and are expected to increase their production schedules still further over the next 30-60 days. Production schedules of the automobile companies for March indicate a gain of 25% or more over February, and of nearly 70% over a year ago.

Provided present plans of the automotive producers for March are carried out without a downward revision due to adverse weather conditions or labor troubles, production for the first quarter will approximate 1,060,000 units. This would represent a gain of 60% over the corresponding '38 period, and would be about equal to the production in the first quarter of '35. Production in the first quarter of '39 is expected to exceed by a small margin the output in the final 3 months of '38. The total output for March is expected to reach 400,000 units. The decline from January to February this year was reported to be approximately 11%, against an average seasonal dip for the past 4 years of 5%. The estimated rise, according to a study recently printed in the *Wall Street Journal*, from February to March this year, is about 27%, which compares unfavorably with the 4-year seasonal gain of 33% during the period '35 to '38 inclusive.

With a gain in automotive production a certainty, the outlook in the rubber industry is a favorable one over the next few months. January crude rubber consumption totaled 46,234 tons, as compared with 45,315 tons in December and only 29,429 tons in January of '38.

Price changes were few in the past month. The schedule on mixed amyl chlorides was revised downward. Tanks are now 4.65c; carlots, drums, are 5.65c; and l.c.l. quantities are 6.65c. All prices are f.o.b. Wyandotte, Mich., terms 1% 10 days—30 days net.

Quotations for the principal petroleum solvents were unchanged. A better demand helped to provide greater price stability in certain sections of the country. Specially good was the call for rubber solvent and petroleum thinner. Cleaners' naphthas were only in slightly better demand.

A new and much lower price schedule was announced on Feb. 22 for mesityl oxide. Tankcars are now 10½c; carlots, drums, are 11½c; and l.c.l. shipments are quoted at 12c. Prices are f.o.b. destination, drums included and not returnable.

The schedule on tricresyl phosphate was simplified somewhat by eliminating No. 2 technical material. The current prices for technical are based on 22c for carlots.

With consumption increasing a firmer price situation has developed in acetone, butyl alcohol, ethyl acetate, etc. Alcohol also is firmer. Industrial consumption of alcohol has improved considerably in the last few weeks.

January Alcohol Statistics

January ethyl alcohol production was 17,067,489 proof gals., as compared with 15,607,206 gals. in January of '38. January output of completely denatured alcohol amounted to 474,139 wine gals., as compared with but 168,465 gals. in the like month a year ago. Production of C. D. alcohol in the period July 1, '38 to Jan. 31, '39 reached 14,537,840 gals., against 21,619,301 gals. in the corresponding period a year earlier. The January removal of C. D. alcohol totaled 443,686 gals., as compared with but 178,157 gals. in January of '38. Stocks at the month-end were reported at 455,280 gals., compared with 537,258 gals. on Jan. 31, '38.

January production of specially denatured was 6,354,358 wine gals. Output in January of '38 was but 5,714,329 gals. January removal of specially denatured totaled 6,276,800 gals., as compared with 5,760,616 gals. in the corresponding period a year earlier. Stocks on Jan. 31, '39 were reported at 923,447 gals., a heavy gain over the 554,433 gals. reported on Jan. 31, '38. Production of specially denatured in the period July 1, '38 and Jan. 31, '39 amounted to 47,768,448 gals., a definite gain over the 41,445,106 gals. produced in the similar period 12 months earlier.

New Girbotol Installation

The Sun Oil Co. has entered into an agreement with The Girdler Corp., Louisville, Ky., for the installation of a Girbotol gas purification plant at its Marcus Hook, Pa., refinery. Eleven million cu. ft. per day of refinery gas will be treated for the removal of H_2S.

Anderson With Philipp Brothers

R. E. Anderson is a recent addition to the sales staff of Philipp Brothers, well-known N. Y. City distributor of heavy chemicals. He formerly was with Jungmann & Co., and previous to that with Givaudan-Delawanna. Philipp Brothers maintain branch offices in Boston and Providence. George Smith is vice-president in charge of sales, assisted by Frank J. Edwards.

Others in new positions include:—Charles C. Arnold, Jr., formerly chief chemist in the Industrial Finishes Division of the Zapon Division of Atlas Powder, now with The Lilly Co., High Point, N. C., as a research chemist. . . M. A. Bredig, formerly of Germany, now with the Vanadium Corp. of America, Bridgeville, Pa. . . Z. G. Deutsch, well-known in the heavy chemical and alkali fields, is now an engineering consultant with offices at 420 Lexington ave., N. Y. City.

Important Price Changes

	Feb. 28	Jan. 31
ADVANCED		
None.		
DECLINED		
Mesityl oxide, tks.	$0.10½	$0.20
c. l., drs.	.11½	.21
Mixed amyl chlorides, tks.	.0465	.06
c. l., drs.	.0565	.07

Chew a Granddad

Mr. and Mrs. LeBaron Sands Willard, Jr., of Ipswich, Mass., announce the birth of a son on Feb. 27 at Phillipps House, Boston. Mrs. Willard is the former Miss Elizabeth Chew, daughter of Mr. and Mrs. John Aldridge Chew of N. Y. City and Berryville, Va.

Opens Oklahoma City Branch

Barada & Page, Inc., well-known chemical distributor in Kansas City, is opening a new branch in Oklahoma City, Okla., at 203 S. Compress st., with O. A. Collings as manager. The telephone number is 7-1171. This is the third branch office of the company, the others being located at Wichita, Kans., and Tulsa.

Moves N. Y. City Offices

The N. Y. City office of Chemical Sales Corp., Buffalo, N. Y., has been moved to the Empire State Bldg. Office is in charge of Herbert Schiel.

Georges Bacq, chief, refractories dept., Union Chimique Belge, sailed for Belgium in the *Paris* on Feb. 11 after a visit of 4 weeks in this country.

Houdry Process Corp. reports that it has sold a license under its catalytic cracking patent to Standard of California. Process is used for production of high octane motor gasoline and aviation fuels.

Natural Raw Materials

Corn Derivatives Quoted At Lower Levels

Buyers Hold to Conservative Purchasing Ideas—Egg Products Weak—Japan Wax Higher at Primary Source—Slightly Firmer Tone in Naval Stores—New Rosin Distributor—

Important Price Changes

ADVANCED	Feb. 28	Jan.. 31
Valonia beards	$47.00	$45.00
cups	31.00	30.00
Wax Japan	.10¾	.10¼
DECLINED		
Corn Sugar	$2.99	$3.09
Syrup 42°	3.02	3.12
43°	3.07	3.17
Dextrin, British gum	3.65	3.75
Corn canary	3.40	3.50
Imported, potato	.07	.07¼
Egg albumen, dom., cryst.	.71	.73
Egg yolk	.60	.65
Gum Manila Loba B	.09¾	.10¼
Loba C	.09	.09¾
Loba D	.08⅜	.09⅜
DK	.05⅝	.06
Myrobalans J 1	24.00	25.00
Starch, corn	2.50	2.60
powdered	2.60	2.70
Tapioca flour	.01¾	.02

Shellac Importers Elect

The new officers of the U. S. Shellac Importers' Association are as follows:—President, Herbert Suhr, of J. Cornelis; vice-president, Morris Rosen, Mantrose Corp.; treasurer, Ralph McClintock, MacLac Co. George Ashby continues as secretary.

Board of directors for this year is:—John R. Anderson, of Ralli Brothers; Louis Gillespie, of Gillespie-Rogers-Pyatt; Philip Rowe, of Philip Rowe, Inc.; Adrian Jacobs, of Dings & Schuester, and Alfred Lerden, of Alfred Kramer & Co.

Ogden Dies at 81

J. Herbert Ogden, 81, a director of American Dyewood, died on Feb. 21 at his home in Lansdowne, near Philadelphia. He retired from active management of the company several years ago after serving more than 50 years. Mr. Ogden twice served as a delegate to Republican National Conventions.

Camera Chemists' Salon

The Chicago Camera Chemists invite chemists to submit prints in their 3rd Annual Salon, to be held May 1 to 31. Closing date for receiving prints is April 18. Six pictorial prints with an entry fee of $1.00, and 4 scientific prints, entry fee 50c, may be submitted. Entry blanks may be obtained from C. E. Schaar, 754 W. Lexington st., Chicago, or G. Wilson Thomas, 210 W. Hickory st., Hinsdale, Ill.

Secretary Ickes on Feb. 17 prohibited the issuing of leases for drilling for oil and gas on public lands in the vicinity of Carlsbad, N. M. It is feared that the use of water in drilling would leach out the potash from the beds.

"Hand-to-mouth" purchasing ideas were still very much in evidence in the markets for most of the natural raw materials. The bearish tendencies outweighed the bullish ones, with the result that most of the price changes were on the downward side.

The corn derivatives were reduced slightly when prices in the grain turned easier, erasing the gain recorded a month earlier. The price movement in the natural tanstuffs was a mixed one. Valonia beards and cups were quoted at higher levels, while myrobalans J1 was reduced slightly. Egg albumen was off 2c, to a basis of 71c. Two separate price declines brought the price level of egg yolk to 60c.

A number of the natural varnish gums worked into lower price ground in the past 30 days, continuing the general movement of the last few months. Paint and varnish makers last month came into the market in larger numbers for small replacement purchases, and with stocks in the hands of consumers thought to be unusually small, increased purchasing volume is expected to materialize shortly. Certain factors for this reason are definitely on the bullish side of the market.

Japan Wax Advanced

The wax markets generally passed through a rather routine period. Additional price strength developed in Japan wax. Replacement costs have risen substantially, with the result that importers are holding local stocks for higher prices. Crude beeswax was slighty unsteady, but bleached and refined grades were firm at unchanged price levels. The replacement cost in Candelilla has been maintained, but some competition exists between local sources of supply preventing a general price increase in the commodity. Keen competition marked the local trading in spot lots of Carnauba, despite the fact that cable advices from Brazil indicate a firmer price tone at the primary source. Local stocks of the item are said to be quite heavy, hence the reason for the current price weakness.

The shellac market continues to be more a buyer's than a sellers' market. Consumption has increased slightly, yet there is very little indication that prices will work into higher ground for some time. Stocks in London are still heavy and hang as a definite deterrent on any appreciable price advance.

A slightly firmer tone was in evidence in the principal naval stores primary markets. Shipping instructions against existing contracts have been in greater volume and spot business also has picked up. As yet the industry has had no definite word on the granting of funds for the production and marketing of naval stores during the coming season. With but 30 days to the beginning of the new naval stores year, it is expected that a definite announcement will be forthcoming out of Washington at almost any moment.

Increases Albumen Production

Cross Chemical Works, Pasadena, Calif., is building a new addition to its plant for the exclusive extraction of vegetable albumen, a process which was worked out including a method of removing the alkaloids present. Application for a patent for this process has been made. A complete new pilot plant which will produce 600 lbs. of finished vegetable albumen per day will be ready to operate April 1. Stuart M. Finch & Staff, Culver City, Calif., are the chemical engineers in charge of erection and equipment.

New Naval Stores Distributor

Lloyd B. Bell, formerly with the naval stores department of C. Tennant Sons & Co., N. Y. City, has organized the firm of Lloyd B. Bell & Co., with offices at 19 W. 44th st. New firm will specialize in rosin, turpentine and other naval stores products as broker and selling agent.

Canadian Chemists Pick Dates

The 22nd Annual Canadian Chemical Convention will be held this year in London, Ontario, June 5 to 8. T. A. Faust, president of Yocum-Faust, Ltd., is the chairman of the local committee, with Dr. J. A. Gunton, Head of the department of chemistry, University of Western Ontario, vice-chairman. A number of committees have been formed and plans for the local arrangements are already well advanced.

Several new features will be incorporated in the program this year. At the general sessions and public lectures, outstanding speakers will be heard and Prof. Otto Maass, F.C.I.C., director of the department of chemistry, McGill University, and president of the Canadian Institute of Chemistry, and Dr. R. K. Stratford, director of research, Imperial Oil, Ltd., and president of the Canadian Chemical Association, will deliver presidential addresses.

Allen W. Ripley Dies

Allen W. Ripley, Sr., 67, superintendent, Atlanta plant of Virginia-Carolina Chemical, on Feb. 13.

Mixers Expect 7,000,000 Ton Sale This Season

Trading in Raw Fertilizer Materials Light—January Tax Tag Sales Slightly Below Like Month of '38—Davison Adopts Income Security Plan for its Workers—Crady Dies at 62—

Trading in most of the raw fertilizer materials was light in character in the last 30 days. Mixers appear to be well-stocked with most items and buying of raw materials was largely of the last-minute, fill-in variety. Already, mixers are making heavy shipments in the Southern area and so far the price structure has held up well. General consensus of opinion is that the present fertilizer season will see sales of approximately 7,000,000 tons.

Price changes largely centered in the natural ammoniates. Dried blood and nitrogenous material were quoted at lower levels at the month-end. Stocks of tankage were scarce in nearly all sections of the country other than Chicago. Hoofmeal declined 10c per unit at Chicago. Imported raw bone and also the various grades of imported bonemeal were advanced slightly during the period under review.

Only routine demand was in evidence for sodium nitrate and sulfate. The price structures of both were firm and unchanged. The situation in potashes was unaltered. A slightly improved call for superphosphates was noted, particularly in the Southern area. The fish scrap market at Baltimore was largely nominal and factors there report little or no immediate buying interest.

January ammonium sulfate production totaled 45,756 tons, a decline of 0.2% from the December figure of 45,837 tons. Production in January, '38, amounted to only 37,734 tons.

January Sales—450,581 Tons

Fertilizer tonnage in January in 17 states as indicated by the sale of tax tags totaled 450,581 tons. This was slightly less than the tonnage in January of '38, but was substantially larger than two years ago.

Total sales in the first 7 months of the current fiscal year, from July through January, were practically the same as in the corresponding period of the last two years, as shown in the following tabulation.

Tag Sales in July-January Period

Year	12 Southern States	5 Midwestern States	17 States
'28-'29	961,000	200,000	1,161,000
'29-'30	991,000	225,000	1,216,000
'30-'31	766,000	169,600	936,000
'31-'32	537,000	97,400	634,000
'32-'33	587,000	63,400	650,000
'33-'34	857,000	104,600	962,000
'34-'35	808,000	144,100	952,000
'35-'36	861,000	189,500	1,050,000
'36-'37	1,088,000	271,800	1,360,000
'37-'38	1,100,000	267,600	1,368,000
'38-'39	1,146,000	212,000	1,358,000

January sales in the 12 Southern states amounted to 438,105 tons, an increase of about 600 tons over January '38 and 16,000 tons larger than in January '37. This was the 3rd consecutive month in which sales had been above the corresponding month of the preceding year. Increases over last year were registered in 4 states—North Carolina, Georgia, Alabama, and Arkansas. Total increase in these states was slightly more than sufficient to offset the losses in the other 8 states. Sales in January in the Southern states in the last 3 years averaged 8.3% of the year's total sales.

July-January sales in the South were somewhat larger than in the last two years, exceeding the '37-'38 period by 4%. Increases over last year were reported by 4 states and decreases by 8. Largest tonnage increase occurred in Georgia, with Mississippi sales also showing a sharp increase. Arkansas sales were up substantially while the gain in North Carolina was more moderate. In 5 of the 8 states reporting lower tonnages the figures for this year were greater than two years ago.

Tag sales in January in Indiana and Kansas were larger than last year, but the effect of these increases was much more than offset by declines in the other 3 states in the midwestern group. Kentucky sales were about one-fourth as large as a year ago. Sales in the 7-month period in the Midwest were 21% lower than last year, with Kansas the only state to show larger sales. Decline in Kentucky was 48%.

Introduces Security Plan

Davison Chemical, fertilizer manufacturer, has inaugurated at its Curtis Bay, Baltimore plant, an Income Security Plan for its regular hourly paid employees for the purpose of providing throughout the year income equivalent to 30 hours pay as a minimum per week for employees in this group. The desirability for such a plan arises from the seasonal nature of the fertilizer business. Production and shipments of fertilizer and fertilizer materials must, to a large extent, parallel the actual use of these products by the farmers, with the result that the curve of activity in plants engaged in this industry shows tremendous fluctuations monthly throughout the year.

Wood Crady Dies

Wood Crady, 62, widely known in fertilizer circles, died on Feb. 22 at his home in Louisville, Ky. He had been in poor health for several months. He joined the Federal Chemical Co. in '15, first as a salesman, then subsequently holding the positions of sales manager, general sales manager, and vice-president. He was also on the board of directors.

Mr. Crady was chairman of the new Middle West Soil Improvement Committee which was organized last year and was greatly interested in the work that is now being carried on by that Committee.

He attended the First International Fertilizer Congress, which was held at Rome, Italy, Oct. 3 to 6, '38, as one of the official delegates representing the U. S.

Important Price Changes

ADVANCED	Feb. 28	Jan. 31
Bone, imported	$22.50	$22.00
Bonemeal, imported 3 & 50	22.50	22.00
DECLINED		
Blood, dried	$3.00	$3.30
imported	2.85	2.95
Fish scrap, Jap.	48.25	48.50
Hoofmeal, Chgo.	2.75	2.85
Nitrogenous mat., East	2.45	2.50
imported	2.45	2.50
Tankage, fert. grd., Chgo.	3.25	3.50

New Mid-West Research

H. H. Tucker, now superintendent of the New Jersey Branch Experiment Station in Sussex, N. J., will become manager and agronomist of a regional office shortly to be opened in Columbus, Ohio, for the conduct of promotional and research work on the use of by-product ammonia as fertilizer. This work will be under the direction of The Barrett Company.

H. H. TUCKER

Mr. Tucker graduated from University of Illinois in '27. He continued his studies in dairy husbandry and agricultural biochemistry at Pennsylvania State College, from which he secured his M.S.

Mr. Tucker then joined the staff of the New Jersey Agricultural Experiment Station and Rutgers University, and in May, 1931, was appointed Superintendent of the new North Jersey Branch Experiment Station at Sussex, N. J.

Cadmium Sulfide (Orange) Reduced 5¢ per Lb.

Casein Prices Go To Lower Levels—White-Lead-in-Oil Higher —Trading In Varnish Gums Spotty—Paint Manufacturers Anticipate Satisfactory Spring Season—Convention Date Set—

Pigments and Fillers

Suppliers and dealers of raw coatings materials report that the past month was a very satisfactory one from the tonnage viewpoint. Paint manufacturers are looking forward to one of the best spring seasons in several years, with the result that they have stepped up production schedules to much higher levels. There was a slight lull in buying of raw materials in the final week of the month, but this caused very little comment in the trade. It is generally felt that a breathing period was about due. Although probably the peak has been passed in the active spring period, the trade believes that sales of most of the raw materials will revive substantially in March.

Price stability characterized the markets generally, and price changes were relatively few. Higher prices were announced for rottenstone. The domestic price was increased $3 to $25.50 per ton for carlots. The l.c.l. quotation was advanced $12.50 per ton, while a 2c increase in the imported lump material brings the current market to 14c for carload lots.

A reduction of 5c per lb. in cadmium sulfide to a basis of 75c at the works was said to have stimulated sales. Casein turned lower when buying interest declined. The ½c reduction brings the current market to 8c for 20-30 mesh material in carlots and 8½c for 80-100 mesh material.

Late in the month suppliers of white lead-in-oil advanced prices ½c per lb. The new price structure is 10¼c for dealers, 11¼c for painters, and 12¼c for consumers. Demand was reported as being satisfactory for this period of the year. All of the dry lead pigments held firm at unchanged price levels.

Varnish Gums Reduced

The market for natural varnish gums was spotty during the period under review. Certain of the Copals, and Dammars were reduced in price, despite the fact that demand showed a decided pickup. One interesting development in connection with the natural gums is the announcement of the New Zealand Government that it controls the rights to a new process for refining Kauri and has placed a minimum price in effect.

Upturn In Construction Expected

The strong upturn in building activity which got under way during the spring of 1938 has shown continued expansion since the opening of the new year. Contracts for private construction projects awarded in the 37 Eastern states during January recorded a 39% gain over January of last year, according to F. W. Dodge Corp. The January 1939 figure for private work amounted to $103,757,000 as compared with $74,630,000 for January, '38. During December, privately-owned construction totaled $110,036,000.

The combined January total for both public and private construction contracts amounted to $251,673,000, a 30% increase over January '38; this was the largest opening month's total for any year since '30.

Hobach With Wishnick

George A. Hobach, formerly with Akron Paint & Varnish, and more recently employed in the laboratory of Sherwin-Williams in Cleveland, has joined the sales staff of Wishnick-Tumpeer, Inc., manufacturers and importers of chemicals, oils and pigments for the paint, rubber, printing ink and other industries. He will be located at the Cleveland office.

Administrator of Patents

Edward F. Maloney, vice-president of the Atlantic Research Associates, Inc., Newtonville, Mass., has been appointed administrator of the patents held by the organization concerning the manufacturing and sales of casein paints and particularly casein paste paints. In order to give Atlantic Associates the necessary time his duties will require, Mr. Maloney has resigned as president of Atlantic Research Products, Inc. N. J. Reilly has been made president of the Atlantic Research Products, Inc.

Muralo Plans Chicago Unit

The Muralo Co., manufacturer of water paints, Staten Island, N. Y., plans to establish a production unit in Chicago in April. New plant, for which the Industrial bldg. 2624 W. Lake st., has been leased, will have an approximate annual production of 300,000 gals. of paste and 3,000 tons of powder.

New Bitumastic Distributors

Julio F. Sorzano, industrial sales manager of Wailes Dove-Hermiston Corp., N. Y. City, reports appointment, as distributors of Bitumastic protective coatings, of Brance-Krachy Co., Houston, Tex.; R. W. Hudgins & Son, Norfolk, Va.; The James Walker Co., Baltimore; and Industries Supply Co., San Diego,

Paint Convention Dates

The National Paint, Varnish and Lacquer Association will hold its '39 convention in San Francisco, Nov. 1-3, according to Ernest T. Trigg, president of the association. The Federation of Paint and Varnish Production Clubs' '39 convention and the annual paint show will be held at some convenient intermediate point between the coasts. Dates for the federation meeting and paint show will be arranged so as to allow Eastern and Middle States members of the association to attend the federation meeting either while en route to California or on their return.

Headquarters for the '39 meeting of the association will be in the Fairmont hotel, with the Mark Hopkins hotel, next door to the Fairmont, and the Palace hotel, closely adjacent, serving as auxiliary hotels.

Important Price Changes

ADVANCED	Feb. 28	Jan. 31
Rottenstone, dom.	$25.50	$22.50
imported lump	.14	.12
White lead, in oil,	.10¼	.09⅞
DECLINED		
Cadmium, sulfide, orange	$0.75	$0.80
Casein, 20-30 mesh	.08	.08½
80-100 mesh	.08½	.09

Reichhold Heads Lavanburg

Henry Reichhold has been elected president of the Fred L. Lavanburg Co., dry color manufacturer, Brooklyn. Mr. Reichhold also heads Reichhold Chemicals, Inc., Detroit. Other officers elected at a recent meeting of the directorate follows:

Executive vice-president and general manager, Richard Katz, jr.; secretary, Eugene A. Terray; treasurer, S. H. Baum; vice-president in charge of sales, Selden G. Hait; vice-president in charge of production, Austin J. Farrey, and vice-president, J. H. Ebert.

Mr. Katz, prior to his affiliation with Reichhold Chemicals, Inc., in '37, was actively engaged in the production and sale of chemical pigment colors for many years. Mr. Hait and Mr. Ebert have been with the Lavanburg organization for more than 35 years, and Mr. Farray has been identified with the company since '94.

To Test Paints at Fair

A complete laboratory for testing paints is being installed in the du Pont Exposition building at the N. Y. World's Fair. Reproduced in faithful detail, it will demonstrate the devices which check every property of paints, varnishes and other finishes.

Hard knocks incident to housekeeping, and other uses are artificially created in these "yardstick" tests.

Fats and Oils

Hand-to-Mouth Buying Features Oils and Fats

Declines Outnumber Advances—Chinawood Advances Slightly with Demand Light—Fish Oils Show Further Price Losses—New Soybean Oil Plant at Des Moines, Second Swift Factory—

Important Price Changes

ADVANCED	Feb. 28	Jan. 31
Oil Chinawood	$0.14¾	$0.14½
Coconut, crude, Pac. Coast, tks.	.02¾	.02⅝
Linseed, boiled, tks.	.084	.083
Linseed, raw, tks.	.08	.079
Sardine, crude, tks.	.30	.28½
DECLINED		
Oil Babassu, tks.	$0.06⅛	$0.06½
Corn, crude, tks.	.06	.06⅛
refined, bbls.	.08¾	.09
Lard, common, No. 1, bbls.	.08¾	.09
Menhaden crude, tks.	.30½	.32
ref'd alkali, tks.	.066	.07
blown, drs.	.072	.076
kettle-bodied, drs.	.082	.086
light-pressed, tks.	.06	.064
Oiticica, drs.	.09¼	.10½
Oleo, No. 1	.07¾	.08
No. 2	.07	.07¼
Olive, denatured	.88	.92
Peanut crude, tks.	.06	.06⅛
ref'd edible, bbls.	.09	.09½
Perilla, tks.	.089	.09
Sardine, ref'd alkali, tks.	.066	.07
kettle bodied, drs.	.082	.086
light-pressed, tks.	.06	.064
Tallow, acidless, tks.	.08	.08¼

Factory Producers Meet

Following the Domestic Fats and Oils Conference, held in Washington Feb. 2-4, a national organization representing farm and factory producers of more than half of all domestic fats and oils was formed. The officers are:—President, J. F. Johnson, St. Louis; first vice-president, T. J. Kidd, Birmingham, Ala.; treasurer, Roger E. Morse, Boston, Mass.; secretary and assistant treasurer, F. B. Wise, Washington.

Directors, representing commodity groups, are as follows: Soybean producers, G. G. McIllroy, Irwin, Ohio; butter producers, A. M. Loomis, Washington, D. C.; cottonseed oil producers, T. J. Kidd, Birmingham, Ala., and J. I. Morgan, Farmville, N. C.; soybean oil producers, J. F. Johnson, St. Louis, Mo.; corn oil producers, J. B. Newman, Washington, D. C.; tallow and grease producers, Roger E. Morse, Boston, Mass.; fish oil producers, W. S. Snow, Alexandria, Va.; southern commissioners of agriculture, Harry D. Wilson, Baton Rouge, La., and C. C. Hanson, Memphis, Tenn.

Tariff Changes Data

The U. S. Tariff Commission, Washington, has just published "Changes in Import Duties Since the Passage of the Tariff Act of 1930." Publication also lists items on which rates of duty or duty-free status have been bound in trade agreements. Copies at 45c each are available from the Supt. of Documents, Washington, D. C.

There was little or no change in the attitude of buyers last month toward making substantial future commitments. With fats and oils prices generally tending downward, no real incentive existed for consumers to do anything but adhere to the policy of placing orders only for relatively small quantities. Many items are at the lowest point in nearly a year. Such a price situation is not conducive to buying on a large scale, or for the placing of long-term commitments. At the month-end a slight flurry of purchasing took place and prices exhibited firmer tendencies, but the attitude of the trade, both buyers and sellers, was one of doubt that any sustained bullish price movement was likely at this time.

A firm tone in Chinawood was reported with offerings light. Buyers were said to be inclined to restrict purchasing awaiting further political developments abroad. There is very little definite information coming through on shipping conditions and state of stocks abroad and this situation was further aggravated at the month-end because of the Chinese holiday period.

In some ways it is surprising that the occupation by the Japanese of interior Chinese points has not had the effect of driving Chinawood oil prices up sharply. However, consumption has been considerably below normal for months and the increasingly greater use of synthetic drying oils and the introduction of new natural drying oils are some of the offsetting factors. In some quarters in this country the opinion is being expressed that oil is being purposely withheld in China in an effort to boost the price and that this effort has been made possible by the loan of $25,000,000 to China through the Export-Import Bank.

Refined Fish Oils Lower

Crude sardine oil was quoted at higher levels in the past 30 days, while crude menhaden was lower. The refined grades, however, of both lost ground in the face of light demand. The general price movement of the animal fats and oils was downward during most of February.

A slightly firmer market was reported in crude coconut. The generally accepted reason for the advance was greater interest in copra in the last 30 days on the part of European buyers. Both crude and refined corn oil prices were lower at the month-end, and the same was also true of crude and refined peanut oil. Linseed quotations were somewhat higher. Shipments were heavier in the past month. The firmer tone was also attributed to a reduction in the flaxseed crop estimate. Shipping instructions against existing contracts were reported by the crushers as being satisfactory for this time of the year.

January Cottonoil Consumption

January consumption of cottonseed oil was above trade expectations at a total of 229,666 bbls. The latter figure was 28,092 bbls. above the average trade guess on consumption, although far below January, '38, when 378,092 bbls. were consumed. In December consumption totaled 209,706 bbls.

The visible supply of oil and seed on Feb. 1 totaled 2,688,400 bbls. against 2,780,500 bbls. on Jan. 1, '39 and 2,744,500 bbls. on the same day a year ago.

Consumption so far this season, August through January, has amounted to 1,570,000 bbls. against 2,370,000 during the corresponding period last season. The visible supply of oil at present is large, and many in the trade are inclined to believe that the carryover at the end of this season will be substantial due to the sharp falling off in consumption compared with previous years. The report was bullishly construed.

Swift Starts 2nd Plant

Swift and Co. is starting erection of a second soybean oil plant, this one at Des Moines. In general the plant will be similar to the one at Champaign, Ill., and will cost approximately $300,000.

Chemurgic Meeting Dates

National Farm Chemurgic Council will hold a meeting in Jackson, Miss., March 29 to April 1. Technical discussions will consider all phases of wood pulp and paper; cotton and cotton by-products; and vegetable oils and fats. On the final day of the conference a trip will be made to the plant of the Masonite Corp. at Laurel, Miss., and also will provide the opportunity to inspect the plant for the processing of sweet potatoes into starch.

Adds New Designer to Staff

Charles C. Morrison, well-known artist and industrial designer, has joined the packaging development staff of Owens-Illinois Can Co., for whom he will act as consultant and package development contact man, with headquarters in N. Y. City.

Mr. Morrison was formerly associated with Continental Can and brings to Owens-Illinois a background of many years experience, specializing in metal package structure and design.

"NEITHER SNOW NOR RAIN..."

"Neither snow nor rain nor heat nor gloom of night" stops the power linemen from the completion of their tasks. The welfare of the nation depends on their broad shoulders and nimble fingers servicing the vast network of the country's power and electric light service. Our hats are off to these dauntless trouble shooters and to their employers who appreciate the part Starkie Wire Finishes play in keeping break-downs at a minimum.

No. 131 U. R. C. finish is composed of vegetable oils, Starkie synthetic fatty acid pitches and gilsonite, carefully blended together by a patented process exclusively controlled by the A. E. Starkie Company. The weather-resisting properties of the individual constituents are well known and recognized by all scientific investigators. They have passed excellent weather-resistant tests in the standard weather-ometer. The finished product also passes an excellent accelerated test in the weatherometer as well as service tests of years' duration on the line.

STARKIE WEATHERPROOF AND CODE WIRE FINISHES

"Tailor Made To Your Requirements"

STARKIE BINDER A Pure Synthetic Pitch • ASPHALT • GILSONITE • VEGETABLE OILS • VEGETABLE AND ANIMAL FATTY ACIDS • NAPHTHENIC ACIDS • STEARIC ACID • ASBESTOS FIBRES • CAROB FLOUR • BENTONITE • DIATOMACEOUS EARTH

A. E. STARKIE CO.

1645 S. KILBOURN AVE. CHICAGO, ILLINOIS

Prices Current

Heavy Chemicals, Coal-tar Products, Dye-and-Tanstuffs, Colors and Pigments, Fillers and Sizes, Fertilizer and Insecticide Materials, Petroleum Solvents and Chemicals, Naval Stores, Fats and Oils, etc.

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f. o. b. works are specified as such. Import chemicals are so designated. Resale stocks when a market factor are quoted in addition to maker's prices and indicated "second hands."

Oils are quoted spot New York, ex-dock. Quotations f. o. b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f. o. b., or ex-dock. Materials sold f. o. b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both. Containers named are the original packages most commonly used.

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1937 Average $1.10 - Jan. 1939 $1.25 - Feb. 1939 $1.25

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Acetaldehyde, drs. c-l, wks lb	...	.14		.14		.14
Acetaldol, 95%, 50 gal drs wks lb.	.21	.25	.21	.25	.21	.25
Acetamide, tech, lcl, kgs lb.	.39	.43	.39	.43	.32	.43
Acetanalid, tech, 150 lb bbls lb.	...	.29	...	.29	.29	.32
Acetic Anhydride, drs, f.o.b. wks, frt all'd lb.	.10½	.11	.10½	.11	.10½	.11
Acetin, tech, drs. lb.	...	.33	...	.33		.33
Acetone, tks, f.o.b. wks, frt all'd lb.	...	.04¼	.04¼	.04¾		.04¾
drs, c-l, f.o.b. wks, frt all'd lb.		.05¾		.05¾		.05¾
Acetyl chloride, 100 lb cbys lb.	.55	.68	55	.68	.55	.68
ACIDS						
Abietic, kgs, bbls lb.	.08¾	.09	.08¾	.09	.08¾	.10
Acetic, 28%, 400 lb bbls, c-l, wks 100 lbs.	...	2.23	...	2 23	...	2.23
glacial, bbls, c-l, wks 100 lbs.	...	7.62	...	7.62	...	7.62
glacial, USP, bbls, c-l, wks. 100 lbs.	...	10.25	...	10.25	...	10.25
Acetylsalicylic, USP, 225 lb bbls lb.	...	.50	...	.50	.50	.60
Adipic, kgs, bbls lb.	...	.72		.72		.72
Anthranilic, ref'd, bbls lb.	1.15	1.20	1.15	1.20	1.15	1.20
tech, bbls lb.		.75		.75		.75
Ascorbic, bot oz.	2.75	3.00	2.75	3.25	...	...
Battery, cbys, wks 100 lbs.	1.60	2.55	1.60	2.55	1.60	2.55
Benzoic tech, 100 lb kgs lb.	.43	.47	.43	.47	.43	.47
USP, 100 lb kgs lb.	.54	.59	.54	.59	.54	.59
Boric, tech, gran, 80 tons, bgs, delv ton *a*	...	96.00	...	96.00	95.00	96.00
Broenner's, bbls lb.		1.11		1.11		1.11
Butyric, edible, c-l, wks, cbys lb.	1.20	1.30	1.20	1.30	1.20	1.30
synthetic, c-l, drs, wks lb.	...	.22	...	.22	...	.22
wks, lcl lb.	...	.23	...	.23	...	.23
tks, wks lb.		.21		.21		.21
Camphoric, drs lb.	5.50	5.70	5.50	5.70	5.50	5.70
Caproic, normal, drs. lb.	...	.35	...	.35	...	...
Chicago, bbls lb.	...	2.10	...	2.10	...	2.10
Chlorosulfonic, 1500 lb drs, wks lb.	.03½	.05	.03½	.05	.03½	.05
Chromic, 99¾%, drs, delv lb.	.15¼	.17¼	.15¼	.17¼	.15¼	.17¼
Citric, USP, crys, 230 lb bbls. lb. *b*	.21	.22½	.21	.22½	.22	.25
anhyd, gran, bbls lb. *b*	...	.24	.24½	.25	.25½	.26½
Cleve's, 250 lb bbls lb.	...	.57	...	.57	.50	.57
Cresylic, 99%, straw, HB, drs, wks, frt equal gal.	.63	.64	.63	.64	.63	.91
99%, straw, LB, drs, wks, frt equal gal.	.69	.71	.69	.71	.69	.94
resin grade, drs, wks, frt equal lb.	.09	.09½	.09	.09½	.09	.11¼
Crotonic, bbls, delv lb.	.21	.50	.21	.50	.21	1.00
Formic, tech, 140 lb drs lb.	.10½	.11½	.10½	.11½	.10½	.11½
Fumaric, bbls lb.	...	.75	...	.75	.60	.75
Fuming, see Sulfuric (Oleum)						
Gallic, tech, bbls lb.	.70	.73	.70	.73	.70	.79
USP, bbls lb.	.77	.81	.77	.81	.77	.91
Gamma, 225 lb bbls, wks lb.	...	.85	...	.85	...	.85
H, 225 lb bbls, wks lb.	.50	.55	.50	.55	.50	.55
Hydriodic, USP, 47% lb.	...	2.30	...	2.30	2.20	2.30
Hydrobromic, 34% conct 155 lb cbys, wks lb.	.42	.44	.42	.44	.42	.44
Hydrochloric, see muriatic						
Hydrocyanic, cyl, wks lb.	.80	1.30	.80	1.30	.80	1.30
Hydrofluoric, 30%, 400 lb bbls, wks lb.	.07	.07½	.07	.07½	.07	.07½
Hydrofluosilicic, 35%, 400 bbls, wks lb.	.09	.09½	.09	.09½	.09	.15
Lactic, 22%, dark, 500 lb bbls lb.	.02½	.02¾	.02½	.02¾	.02½	.02¾
22%, light ref'd, bbls lb.	.03½	.03¾	.03½	.03¾	.03½	.03¾
44%, light, 500 lb bbls lb.	.05½	.05¾	.05½	.05¾	.05½	.05¾
44%, dark, 500 lb bbls lb.	.06½	.06¾	.06½	.06¾	.06½	.06¾
50%, water white, 500 lb bbls lb.	.10½	.11½	.10½	.11½	.10½	.11½
USP X, 85%, cbys lb.	.42	.45	.42	.45	.42	.45
Lauric, drs. lb.	11¾	.12¼	.11¾	.12¼	.08½	.12¼
Laurent's, 250 lb bbls lb.	.45	.46	.45	.46	.45	.46
Levulinic, 5 lb bot wks lb.	...	2.00	...	2.00	...	2.00
Linoleic, bbls lb.	...	.20	...	.20	...	.20
Maleic, powd, kgs lb.	.30	.40	.30	.40	.30	.40
Malic, powd, kgs lb.	.45	.60	.45	.60	.45	.60
Metanillic, 250 lb bbls lb.	.60	.65	.60	.65	.60	.65
Mixed, tks, wks N unit	.06½	.07¼	.06½	.07¼	.06½	.07¼
S unit	.008	.009	.008	.009	.008	.009
Monochloracetic, tech, bbls lb.	.16	.18	.16	.18	.16	.18
Monosulfonic, bbls lb.	1.50	1.60	1.50	1.60	1.50	1.60

a Powdered boric acid $5 a ton higher in each case; USP $15 higher; *b* Powdered citric is ½c higher; kegs are in each case ½c higher than **bbls.**; *y* Price given is per gal.

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Muriatic, 18°, 120 lb cbys, c-l, wks 100 lb.	...	1.50	...	1.50	...	1.50
tks, wks 100 lb.	...	1.00	...	1.00	...	1.00
20°, cbys, c-l, wks 100 lb.	...	1.75	...	1.75	...	1.75
tks, wks 100 lb.	...	1.10	...	1.10	...	1.10
22°, c-l, cbys, wks 100 lb.	...	2.25	...	2.25	...	2.25
tks, wks 100 lb.	...	1.60	...	1.60	...	1.60
CP, cbys lb.	.06½	.07⅛	.06½	.07⅛	.06½	.07⅛
N & W, 250 lb bbls lb.	.85	.87	.85	.87	.85	.87
Naphthenic, 240-280 s.v., drs lb.	.10	.13	.10	.13	.10	.13
Sludges, drs lb.	...	.05	...	.05	...	.05
Naphthionic, tech, 250 lb bbls lb.	.60	.65	.60	.65	.60	.65
Nitric, 36°, 135 lb cbys, c-l, wks 100 lb. *c*	...	5.00	...	5.00	...	5.00
38°, c-l, cbys, wks 100 lb. *c*	...	5.50	...	5.50	...	5.50
40°, cbys, c-l, wks 100 lb. *c*	...	6.00	...	6.00	...	6.00
42°, c-l, cbys, wks 100 lb. *c*	...	6.50		6.50		6.50
CP, cbys, delv lb.	.11½	.12½	.11½	.12½	.11½	.12½
Oxalic, 300 lb bbls, wks, or N Y lb.	.10¾	.12	.10¾	.12	.10¾	.12
Phosphoric, 85%, USP, cbys lb.	.12	.14	.12	.14	.12	.14
50%, acid, c-l, drs, wks lb.	.06	.08	.06	.08	.06	.08
75%, acid, c-l, drs, wks lb.	...	.07½		.07½	.07½	.10½
Picramic, 300 lb bbls, wks lb.	.65	.70	.65	.70	.65	.70
Picric, kgs, wks lb.	.35	.40	.35	.40	.35	.40
Propionic, 98% wks, drs lb.		.22		.22		.22
80% lb.	.16	.17½	.16	.17½	.16	.17½
Pyrogallic, tech, lump, pwd, bbls lb.	...	1.05	...	1.05	...	1.05
cryst, USP lb.	1.45	1.63	1.45	1.63	1.45	1.63
Ricinoleic, bbls lb	...	.35	...	.35	.35	.38
tech, bbls lb.	...	.13	...	.13	...	.13
Salicylic, tech, 125 lb bbls, wks lb.	...	.33	...	.33		.33
USP, bbls lb.	.35	.40	.35	.40	35	.45
Sebacic, tech, drs, wks lb.	...	nom.	...	nom.	.37	.41
Succinic, bbls lb.	...	.75	...	.75	...	.75
Sulfanilic, 250 lb bbls, wks lb.	.17	.18	.17	.18	.17	.18
Sulfuric, 60°, tks, wks ton	...	13.00	...	13.00	...	13.00
c-l, cbys, wks 100 lb.	...	1.25	...	1.25	...	1.25
66°, tks, wks ton	...	16.50	...	16.50	...	16.50
c-l, cbys, wks 100 lb.	...	1.50	...	1.50	...	1.50
CP, cbys, wks lb.	.06½	.07½	.06½	.07½	.06½	.07½
Fuming (Oleum) 20% tks, wks ton	...	18.50	...	18.50	...	18.50
Tannic, tech, 300 lb bbls lb.	.40	.47	.40	.47	.40	.47
Tartaric, USP, gran, powd, 300 lb bbls lb.	.27¼	.27¾	.27¼	.27¾	.24¼	.27¾
Tobias, 250 lb bbls lb.	.65	.67	.65	.67	.65	.67
Trichloroacetic bottles lb.	2.00	2.50	2.00	2.50	2.00	2.50
kgs lb.		1.75		1.75		1.75
Tungstic, tech, bbls lb.	1.70	1.80	1.70	1.80	1.65	2.00
Vanadic, drs, wks lb.	1.10	1.20	1.10	1.20	1.10	1.20
Albumen, light flake, 225 lb. bbls lb.	.52	.60	.52	.60	.52	.60
dark, bbls lb.	.13	.18	.13	.18	.11	.18
egg, edible lb.	.71	.73	.71	.78	.77	1.15
vegetable, edible lb.	.74	.78	.74	.78	.74	.78
ALCOHOLS						
Alcohol, Amyl (from Pentane) tks, delv lb.	...	.101	...	.101	.101	.106
c-l, drs, delv lb.	...	.111	...	.111	.111	.116
lcl, drs, delv lb.	...	.121	...	.121	.121	.126
Amyl, secondary, tks, delv lb.	...	.08½	...	.08½	...	.08½
drs, c-l, delv E, of Rockies lb.	...	.09½	...	.09½	...	.09½
Benzyl, cans lb.	.68	1.00	.68	1.00	.68	1.00
Butyl, normal, tks, f.o.b. wks, frt all'd lb. *d*	...	.08	.08	.08½	.08½	.09
c-l, drs, f.o.b. wks, frt all'd lb. *d*	...	.09	.09	.09½	.09½	.10
Butyl, secondary, tks, delv lb. *d*	...	.06	...	.06	...	.06
c-l, drs, delv lb. *d*	...	.07	...	.07	...	.07
Capryl, drs, tech, wks lb.	...	.85		.85		.85
Cinnamic, bottles lb.	2.00	2.50	2.00	2.50	2.00	2.50
Denatured, CD, 14, 13, c-l, drs, wks gal. *e*	...	.31	.31	.32	.31	.35
tks, East, wks gal.	...	.23	.23	.24	.23	.29
Western schedule, c-l, drs, wks gal. *e*	...	.36	.36	.37	.36	.38
Denatured, SD, No. 1, tks,	...	.21	.21	.22	.22	.27
c-l, drs, wks gal. *e*	...	.27	.27	.28	.28	.33

c Yellow grades 25c per 100 lbs. less in each case; *d* Spot prices are 1c higher; *e* Anhydrous is 5c higher in each case; *f* Pure prices are 1c higher in each case.

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

Prices—Current

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Alcohols (continued):						
Diacetone, pure, c-l, drs, delv ... lb. *f*	...	.09	.09	.11½	...	.11½
tech, contract, drs, c-l, delv ... lb.	...	.08½	.08½	.10½	...	.10½
Ethyl, 190 proof, molasses, tks ... gal. *g*	...	4.47½	4.47½	4.48½	4.04	4.51½
c-l, drs ... gal. *g*	...	4.53½	4.53½	4.54½	4.10	4.59½
c-l, bbls ... gal. *g*	...	4.54½	4.54½	4.55½	4.11	4.58½
Furfuryl, tech, 500 lb drs lb.	.25	.35	.25	.35	.25	.35
Hexyl, secondary tks, delv lb.	...	.12	...	.12	...	.12
c-l, drs, delv ... lb.	...	.13	...	.13	...	.13
Normal, drs, wks ... lb.	3.25	3.50	3.25	3.50	3.25	3.50
Isoamyl, prim, cans, wks lb.	...	.32	...	.32	...	.32
drs, lcl, delv ... lb.	...	.27	...	.27	...	.27
Isobutyl, ref'd, lcl, drs lb.	...	.09	...	.09	.09	.10
c-l, drs ... lb.	...	.08½	...	.08½	.08½	.09½
tks ... lb.	.	.07½	...	.07½	.07½	.08½
Isopropyl, ref'd, 91%, c-l, drs, f.o.b. wks, frt all'd ... lb.	...	.36	...	.36	...	.36
Ref'd 98%, drs, f.o.b. wks, frt all'd gal.	...	.41	...	.41	...	.41
Tech 91%, drs, above terms ... gal.	...	.33½	...	.33½	...	.33½
tks, same terms gal.	...	.28½	...	.28½	...	.28½
Tech 98%, drs, above terms ... gal.	...	.37½	...	.37½	...	.37½
tks, above terms .. gal.	...	.32½	...	.32½	...	.32½
Spec Solvent, tks, wks gal.	...	.22	.22	.23	.23	.28
Aldehyde ammonia, 100 gal drs ... lb.	.80	.82	.80	.82	.80	.82
Aldehyde Bisulfite, bbls, delv ... lb.	...	.17	...	.17	...	.17
Aldol, 95%, 55 and 110 gal, drs, delv ... lb.	...	.20	...	.20	...	.20
Alphanaphthol, crude, 300 lb bbls ... lb.	...	.52	...	.52	...	.52
Alphanaphthylamine, 350 lb bbls ... lb.	.32	.34	.32	.34	.32	.34
Alum, ammonia, lump, c-l, bbls, wks ... 100 lb.	3.40	3.65	3.40	3.65	3.40	3.65
delv NY, Phila ... 100 lb.	...	3.40	...	3.40	...	3.40
Granular, c-l, bbls wks ... 100 lb.	3.15	3.40	3.15	3.40	3.15	3.40
Powd, c-l, bbls, wks 100 lb.	...	3.55	...	3.55	...	3.55
Chrome, bbls ... 100 lb.	6.50	6.75	6.50	6.75	6.50	6.75
Potash, lump, c-l, bbls, wks ... 100 lb.	3.65	3.90	3.65	3.90	3.65	3.90
Granular, c-l, bbls, wks ... 100 lb.	3.40	3.65	3.40	3.65	3.40	3.65
Powd, c-l, bbls, wks 100 lb.	3.80	4.05	3.80	4.05	3.80	4.05
Soda, bbls, wks ... 100 lb.	...	3.25	...	3.25	...	3.25
Aluminum metal, c-l, NY 100 lb.	...	20.00	...	20.00	...	20.00
Acetate, 20%, bbls ... lb.	.07½	.09	.07½	.09	.07½	.10
Basic powd, bbls, delv. lb.	.40	.50	.40	.50	.40	.50
Chloride anhyd, 99%, wks lb.	.07	.12	.07	.12	.07	.12
93%, wks ... lb.	.05	.08	.05	.08	.05	.08
Crystals, c-l, drs, wks lb.	.06	.06¼	.06	.06¼	.06	.06¼
Solution, drs, wks ... lb.	.02¾	.03¼	.02¾	.03¼	.02¾	.03¼
Formate, 30% sol bbls, c-l, delv ... lb.	...	.13	...	.13	...	.13
Hydrate, 96%, light, 90 lb bbls, delv ... lb.	.12	.13	.12	.13	.12	.13
heavy, bbls, wks ... lb.	.029	.03½	.029	.03½	.029	.03½
Oleate, drs ... lb.	.16¾	.18½	.16¾	.18½	.16¾	.18½
Palmitate, bbls ... lb.	...	.23	...	.23	...	.23
Resinate, pp., bbls ... lb.	...	.15	...	.15	...	.15
Stearate, 100 lb. bbls .. lb.	.19	.21	.19	.21	.19	.21
Sulfate, com, c-l, bgs, wks ... 100 lb.	...	1.15	...	1.15	1.15	1.35
c-l, bbls, wks ... 100 lb.	. .	1.35	...	1.35	1.35	1.55
Sulfate, iron-free, c-l, bgs, wks, ... 100 lb.	...	2.00	...	2.00	...	2.00
c-l, bbls, wks ... 100 lb.	...	2.20	...	2.20	...	2.20
Aminoazobenzene, 110 lb kgs lb.	...	1.15	...	1.15	...	1.15
Ammonia anhyd fert com, tks lb.	.04½	.05½	.04½	.05½	.04½	.05½
Ammonia anhyd, 100 lb cyl lb.	.16	.22	.16	.22	.16	.22
26°, 800 lb drs, delv lb.	.02¼	.02½	.02¼	.02½	.02¼	.02½
Aqua 26°, tks, NH cont.	...	.04z	...	.04z	...	.05**
tk wagon ... lb.	...	.02	...	.02	...	.02
Ammonium Acetate, kgs lb.	.26	.33	.26	.33	.26	.33
Bicarbonate, bbls, f.o.b. wks ... 100 lb.	5.15	5.71	5.15	5.71	5.15	5.71
Bifluoride, 300 lb bbls ... lb.	.14½	.16½	.14½	.16½	.14½	.17
carbonate, tech, 500 lb bbls ... lb.	.08	.12	.08	.12	.08	.12
Chloride, White, 100 lb bbls, wks ... 100 lb.	4.45	4.90	4.45	4.90	4.45	4.90
Gray, 250 lb bbls, wks ... 100 lb.	5.50	6.25	5.50	6.25	5.50	6.25
Lump, 500 lb cks spot lb.	.10½	.11	.10½	11.	.10½	.11
Lactate, 500 lb bbls ... lb.	.15	.16	.15	.16	.15	.16
Laurate, bbls ... lb.	...	.23	...	.23	...	.23
Linoleate, 80% anhyd, bbls ... lb.	...	.15	...	.15	...	.15
Naphthenate, bbls ... lb		.17	...	.17	...	.17
Nitrate, tech, cks ... lb.	.036	.0385	.036	.0405	.038	.0405
Oleate, drs ... lb.	...	.15	...	.15	...	.15
Oxalate, neut, cryst, powd, bbls ... lb.	.19	.20	.19	.20	.19	.22½
Perchlorate, kgs ... lb.	...	.16	...	.16	...	.16
Persulfate, 112 lb kgs .. lb.	.21	.24	.21	.24	.21	.24
Phosphate, dibasic tech, powd, 325 lb bbls ... lb.	.07½	.10	.07½	.10	.07½	.10
Ricinoleate, bbls ... lb.	...	.15		.15	...	.15
Stearate, anhyd, bbls ... lb.	...	.23	.23	.24	...	.24
Paste, bbls ... lb.	...	.08	.07½	.08	...	.07½

g Grain alcohol 25c a gal. higher in each case. **On a delv. basis.
z On a f.o.b. wks. basis.

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Ammonium (continued):						
Sulfate, dom, f.o.b., bulk ton	...	28.00	...	28.00	26.50	28.50
Sulfocyanide, pure, kgs .lb.	...	.55	...	.55	...	.55
Amyl Acetate (from pentane)						
tks, delv ... lb.	...	.095	.095	.10	.10	.11½
c-l, drs, delv ... lb.	...	.105	.105	.11	...	...
lcl, drs, delv ... lb.	...	.115	.115	.112	...	...
tech, drs, delv ... lb.	...	.10½	...	.10½	.11	.10½
Secondary, tks, delv. .lb.	...	.08½	...	.08½	...	.08½
c-l, drs, delv ... lb.	...	.09½	...	.09½	...	.09½
tks, delv ... lb.	...	.08½	...	.08½	...	.08½
Chloride, norm, drs, wks lb.	.56	.68	.56	.68	.56	.68
mixed, drs, wks ... lb.	.0565	.0665	.0565	.077	.07	.077
tks, wks ... lb.	...	.0465	.0465	.06	...	.06
Mercaptan, drs, wks ... lb.	...	1.10	...	1.10	...	1.10
Oleate, lcl, wks, drs ... lb.	...	.25	...	.25	...	.25
Stearate, lcl, wks, drs .. lb.	...	.26	.	.26	...	.26
Amylene, drs, wks ... lb.	.102	.11	.102	.11	.102	.11
tks, wks ... lb.	...	.09	...	.09	...	.09
Aniline Oil, 960 lb drs and tks ... lb.	.14½	.17½	.14½	.17½	.14½	.17½
Annatto fine ... lb.	.34	.37	.34	.37	.34	.37
Anthracene, 80% ... lb.	...	.55	.55	.75	...	.75
Anthraquinone, sublimed, 125 lb bbls ... lb.	...	.65	...	.65	...	.65
Antimony metal slabs, ton lots ... lb.	...	.11¼	.11¼	.11¾	.10¾	.14
Butter of, see Chloride.						
Chloride, soln cbys ... lb.	...	.17	...	.17	...	.17
Needle, powd, bbls ... lb.	.12	.13	.12	.14	.12½	.16
Oxide, 500 lb bbls ... lb.	.11	.11¾	.11	.12½	.11½	.16½
Salt, 63% to 65%, tins lb.	.26	.27	.26	.27	.26	.27
Sulfuret, golden, bbls .. lb.	.22	.23	.22	.23	.22	.23
Archil, conc, 600 lb bbls .lb.	.21	.27	.21	.27	.21	.27
Double, 600 lb bbls ... lb.	.18	.20	.18	.20	.18	.20
Aroclors, wks ... lb.	.18	.30	.18	.30	.18	.30
Arrowroot, bbls ... lb.	.08½	.09	.08½	.09	.08½	.09
Arsenic, Metal ... lb.	.40	.41	.40	.41	.40	.44
Red, 224 lb cs kgs ... lb.	...	.15¾	...	.15¾	...	.15¾
White, 112 lb kgs ... lb.	.03	.03¾	.03	.03¾	.03	.04
B						
Barium Carbonate precip, 200 lb bgs, wks ... ton	52.50	62.50	52.50	62.50	52.50	62.50
Nat (witherite) 90% gr, c-l, wks, bgs ... ton	41.00	43.00	41.00	43.00	41.00	44.00
Chlorate, 112 lb kgs, NY lb.	.16½	.17½	.16½	.17½	.16½	.17½
Chloride, 600 lb bbls, delv, zone 1 ... ton	77.00	92.00	77.00	92.00	77.00	.92.00
Dioxide, 88%, 690 lb drs lb.	.11	.12	.11	.12	.11	.12
Hydrate, 500 lb bbls ... lb.	.04¾	.05½	.04¾	.05½	.04¾	.05½
Nitrate, bbls ... lb.	.06¾	.07¼	.06¾	.07¼	.06¾	.08¼
Barytes, floated, 350 lb bbls c-l, wks ... ton	...	.23.65	...	23.65	...	23.65
Bauxite, bulk, mines ... ton	7.00	10.00	7.00	10.00	7.00	10.00
Bentonite, c-l, 325 mesh, bgs, wks ... ton	...	16.00	...	16.00	...	16.00
200 mesh ... ton	...	11.00	...	11.00	...	11.00
Benzaldehyde, tech, 945 lb. drs, wks ... lb.	.60	.62	.60	.62	.60	.62
Benzene (Benzol), 90%, Ind. 8000 gal tks, ft all'd .gal.	...	.16	...	.16	...	.16
90% c-l, drs ... gal.	...	.21	...	.21	...	.21
Ind pure, tks, frt all'd gal.	...	.16	...	.16	...	.16
Benzidine Base, dry, 250 lb bbls ... lb.	.70	.72	.70	.72	.70	.72
Benzoyl Chloride, 500 lb drs lb.	.40	.45	.40	.45	.40	.45
Benzyl Chloride, 95-97% rfd, drs ... lb.	.30	.40	.30	.40	.30	.40
Tech, drs ... lb.	.25	.26	.25	.26	.25	.26
Beta-Naphthol, 250 lb bbls, wks ... lb.	.23	.24	.23	.24	.23	.24
Naphthylamine, sublimed, 200 lb bbls ... lb.	1.25	1.35	1.25	1.35	1.25	1.35
Tech, 200 lb bbls ... lb.	.51	.52	.51	.52	.51	.52
Bismuth metal ... lb.	1.05	1.15	1.05	1.15	1.00	1.10
Chloride, boxes ... lb.	3.20	3.25	3.20	3.25	3.20	3.25
Hydroxide, boxes ... lb	3.15	3.20	3.15	3.20	3.15	3.20
Oxychloride, boxes ... lb.	...	2.95	...	2.95	...	2.95
Subbenzoate, boxes ... lb.	3.25	3.30	3.25	3.30	3.25	3.30
Subcarbonate, kgs ... lb.	1.53	1.56	1.53	1.56	1.13	1.58
Trioxide, powd, boxes .lb.	...	3.57	...	3.57	...	3.57
Subnitrate, fibre, drs . lb.	1.33	1.36	1.33	1.36	1.03	1.48
Blanc Fixe, 400 lb bbls, wks ton *h*	40.00	75.00	40.00	75.00	40.00	75.00
Bleaching Powder, 800 lb drs, c-l, wks, contract 100 lb.	...	2.00	...	2.00	...	2.00
lcl, drs, wks ... lb.	2.25	3.60	2.25	3.60	2.25	3.60
Blood, dried, f.o.b., NY unit	...	3.00	3.00	3.50	2.50	3.25
Chicago, high grade .. unit	...	3.25	3.25	3.35	2.35	3.35
Imported shipt ... unit	...	2.85	2.85	3.00	2.90	3.45
Blues, Bronze Chinese Milori Prussian Soluble ... lb.	.36	.37	.36	.37	.36	.37
Ultramarine,* dry, wks, bbls ... lb.	...	.11	...	.11	...	.11
Regular grade, group 1 lb.	...	.16	...	.16	...	.16
Special, group 1 ... lb.	...	.19	...	.19	...	.19
Pulp, No. 1 ... lb.	...	.27	...	.27	...	.27
Bone, 4½ + 50% raw, Chicago ... ton	28.00	29.00	28.00	29.00	25.50	30.00
Bone Ash, 100 lb kgs ... lb.	.06	.07	.06	.07	.06	.07
Black, 200 lb bbls ... lb.	.06½	.08¼	.06½	.08¼	.06½	.08¼
Meal, 3% & 50%, imp ton	...	23.00	22.00	23.00	20.50	23.75
Domestic, bgs, Chicago ton	...	25.00	24.00	26.00	16.00	26.00
Borax, tech, gran, 80 ton lots, sacks, delv ... ton *i*	...	43.00	...	43.00	42.00	43.00
bbls, delv ... ton *i*	...	53.00	...	53.00	52.00	53.00

h Lowest price is for pulp, highest for high grade precipitated; *i* Crystals $6 per ton higher; USP. $15 higher in each case; *Freight is equalized in each case with nearest producing point.

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Borax (continued)						
Tech, powd, 80 ton lots, sacks ton *j*	...	47.00	...	47.00	...	47.00
bbls, delv ton *j*	...	57.00	...	57.00	...	57.00
Bordeaux Mixture, drs lb.	.11	.11½	.11	.11½	.11	.11½
Bromine, cases lb.	.30	.43	.30	.43	.30	.43
Bronze, Al, pwd, 300 lb drs lb.	.90½	.92½	.90½	.92½	.90½	.92½
Gold, blk lb.	.45	.65	.45	.65	.45	.65
Butanes, com 16-32° group 3 tks lb.	.02¼	.03¾	.02¼	.03¾	.02¼	.03¾
Butyl, Acetate, norm drs, frt allowed lb.	...	.09	.09	.09½	.09½	.10½
tks, frt allowed lb.	...	.08	.08	.08½	.08½	.09
Secondary, tks, frt allowed lb.	...	.06½	...	.06½	.06½	.07
drs, frt allowed lb.	.07½	.08	.07½	.08	.07½	.08½
Aldehyde, 50 gal drs, wks lb	.16½	.17½	.16½	.17½	.16½	.17½
Carbinol, norm drs, wks lb.	.60	.75	.60	.75	.60	.75
Crotonate, norm, 55 and 110 gal drs, delv lb.	...	.36	...	36	...	.36
Lactate lb.	.22½	.23½	.22½	.23½	.22½	.23½
Oleate, drs. frt allowed lb.	...	.25	...	.25	...	.25
Propionate, drs lb.	.18	.18½	.18	.18½	.18	.18½
tks, delv lb.	...	.17	...	.17	...	.17
Stearate, 50 gal drs lb.	...	.26	...	.26	...	.26
Tartrate, drs lb.	.55	.60	.55	.60	.55	.60
Butyraldehyde, drs, lcl, wks lb.	...	.35½	...	.35½	...	.35½
C						
Cadmium Metal lb.	...	.80	.80	.85	.85	1.60
Sulfide, orange, boxes lb.	.75	.85	.75	.90	.80	1.60
Calcium, Acetate, 150 lb bgs c-l, delv 100 lb.	...	1.65	...	1.65	...	1.65
Arsenate, c-l, E. of Rockies, dealers, drs lb.	.06¾	.07¼	.06¾	.07¼	.06¾	.07¼
Carbide, drs lb.	.05	.06	.05	.06	.05	.06
Carbonate, tech, 100 lb bgs c-l lb.	...	1.00	...	1.00	...	1.00
Chloride, flake, 375 lb drs, burlap bgs, c-l, delv ton	...	22.00	...	22.00	22.00	23.50
paper bgs, c-l, delv ton	23.00	36.00	23.00	36.00	23.00	36.00
Solid, 650 lb drs, c-l, delv ton	...	20.00	...	20.00	20.00	21.50
Ferrocyanide, 350 lb bbls wks lb.	...	.17	...	.17	...	.17
Gluconate, Pharm, 125 lb bbls lb.	.50	.57	.50	.57	.50	.57
Levulinate, less than 25 bbl lots, wks lb.	...	3.00	...	3.00	...	3.00
Nitrate, 100 lb bgs ton	...	28.00	...	28.00	...	28.00
Palmitate, bbls lb.	.22	.23	.22	.23	.22	.23
Phosphate, tribasic, tech, 450 lb bbls lb.	.06½	.07½	.06½	.07½	.06½	.07½
Resinate, precip, bbls lb	.13	.14	.13	.14	.13	.14
Stearate, 100 lb bbls lb.	.19	.21	.19	.21	.19	.21
Camphor, slabs lb.	.50	.51	.50	.52½	.52	.56
Powder lb.	.50	.51	.50	.52½	.52	.56
Carbon Bisulfide, 500 lb drs lb.	.05	.05¾	.05	.05¾	.05	.05¾
Black, c-l, bgs, delv, price varying with zone† lb.	.02¾	.03¾	.02¾	.03¾	.027	.0380
lcl, bgs, f.o.b. whse lb.	...	.06¼	...	.06¼	.05¾	.06¼
cartons, f.o.b. whse lb.	...	.06¼	...	.06¼	...	.06¼
cases, f.o.b. whse lb.	...	.07	...	.07	...	.07
Decolorizing, drs, c-l lb.	.08	.15	.08	.15	.08	.15
Dioxide, Liq 20-25 lb cyl lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, 55 or 110 gal drs, c-l, delv lb.	.05	.05½	.05	.05½	.05	.06
Casein, Standard, Dom, grd lb.	.08	.08½	.08	.11	.06½	.13½
80-100 mesh, c-l, bgs lb.	.08½	.11	.08½	.11½	.07	.14
Castor Pomace, 5½ NH_3, c-l, bgs, wks ton	...	18.50	...	18.50	18.50	21.00
Imported, ship, bgs ton	...	20.00	...	20.00	20.00	21.00
Celluloid, Scraps, ivory cs lb.	.12	.15	.12	.15	.12	.15
Transparent, cs lb.	...	.20	...	.20	...	.20
Cellulose, Acetate, 50 lb kgs lb.	...	.36	...	.36	.36	.40
Chalk, dropped, 175 lb bbls lb.	.02¾	.03¾	.02¾	.03¾	.02¾	.03¾
Precip, heavy, 560 lb cks lb.	.02¾	.03¼	.02¾	.03¼	.02¼	.04
Light, 250 lb cks lb.	.03¼	.04	.03¼	.04	.03¼	.04
Charcoal, Hardwood, lump, blk, wks bu.	...	.15	...	.15	...	.15
Softwood, bgs, delv* ton	23.00	34.00	23.00	34.00	23.00	34.00
Willow, powd, 100 lb bbls, wks lb.	.06	.07	.06	.07	.06	.07
Chestnut, clarified, tks, wks lb.	...	.01⅝	...	.01⅝	.01⅝	.02125
25%, bbls, wks lb.	...	.02	...	.02	.02	.0225
Pwd, 60%, 100 lb bgs, wks lb.	...	.04½	...	.04½	.04½	.04⅞
China Clay, c-l, blk mines ton	...	7.00	...	7.00	...	7.00
Imported, lump, blk ton	22.00	25.00	22.00	25.00	22.00	25.00
Chlorine, cyls, lcl, wks, contract lb.	.07½	.08½	.07½	.08½	.07½	.08½
cyls, c-l, contract lb. *j*	...	.05½		.05½		.05½
Liq, tk, wks, contract 100 lb.	...	1.75	1.75	2.00	2.00	2.15
Multi, c-l, cyls, wks, cont lb.		1.90	1.90	2.15	2.30	2.55
Chloroacetophenone, tins, wks lb.	3.00	3.50	3.00	3.50	3.00	3.50
Chlorobenzene, Mono, 100 lb drs, lcl, wks lb.	.06	.07½	.06	.07½	.06	.07½
Chloroform, tech, 1000 lb drs lb.	.20	.21	.20	.21	.20	.21
USP, 25 lb tins lb.	.30	.31	.30	.31	.30	.31
Chloropicrin, comml cyls lb.		.80	...	.80		.80
Chrome, Green, CP lb.	.21	.25	.21	.25	.21	.25
Yellow lb.	.14½	.15½	.14½	.15½	.14½	.15½

j A delivered price; * Depends upon point of delivery; † New bulk price, tank cars ¼c per lb. less than bags in each zone.

Current

Chromium Acetate
Dinitrobenzene

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Chromium Acetate, 8% Chrome, bbls ......lb.	.05	.08	.05	.08	.05	.08
Fluoride, powd, 400 lb bbl ....lb.	.27	.28	.27	.28	.27	.28
Coal tar, bbls ....bbl.	7.50	8.00	7.50	8.00	7.50	8.00
Cobalt Acetate, bbls ......lb.	.65	.67	.65	.67	.65	.68
Carbonate tech, bbls ....lb.	...	1.63	...	1.63	...	1.63
Hydrate, bbls ....lb.	...	1.78	...	1.78	1.36	1.78
Linoleate, solid, bbls ...lb.	...	.33	...	.33	...	.33
paste, 6%, drs ....lb.	...	.31	...	.31	...	.31
Oxide, black, bgs .....lb.	...	1.67	...	1.67	...	1.67
Resinate, fused, bbls.. lb.	...	.13½	...	.13½	...	.13½
Precipitated, bbls .....lb.	...	.34	...	.34	...	.34
Cochineal, gray or bk bgs lb.	.35	.38	.35	.38	.35	.38
Teneriffe silver, bgs ....lb.	.36	.39	.36	.39	.36	.39
Copper, metal, electrol 100 lb.	...	11.25	...	11.25	9.00	11.25
Acetate, normal, bbls, wks ....lb.	.21	.23	.21	.23	.21	.23
Carbonate, 400 lb bbls.. lb.	.10½	.11½	.10½	.11½	.10¼	.11½
52-54% bbls ....lb.	.14½	.15½	.14½	.15½	.1340	.16¾
Chloride, 250 lb bbls ...lb.	.13	.14	.13	.14	.12½	.17
Cyanide, 100 lb drs ....lb.	...	.34	...	.34	.34	.38
Oleate, precip, bbls .....lb.	...	.20	...	.20	...	.20
Oxide, black, bbls, wks lb.	.16¾	.17¾	.16¾	.17¾	.13½	.17¾
red 100 lb bbls ......lb.	16¾	.17¾	.16¾	.17¾	.15	.19775
Sub-acetate verdigris, 400 lb bbls ....lb.	.18	.19	.18	.19	.18	.19
Sulfate, bbls, c-l, wks 100 lb.	...	4.50	...	4.50	4.00	4.50
Copperas, crys and sugar bulk c-l, wks ....ton	...	14.00	...	14.00	12.00	14.00
Corn Sugar, tanners, bbls 100 lb.	2.99	3.09	2.99	3.19	2.95	3.30
Corn Syrup, 42°, bbls 100 lb.	...	3.02	3.02	3.12	2.89	3.16
43°, bbls ....100 lb.	...	3.07	3.07	3.17	2.94	3.21
Cotton, Soluble, wet, 100 lb bbls .... lb.	.40	.42	.40	.42	.40	.42
Cream Tartar, powd & gran 300 lb bbls ....lb.	.22¾	.23¼	.22¾	.23¼	.19¾	.23¼
Creosote, USP, 42 lb cbys lb.	.45	.47	.45	.47	.45	.47
Oil, Grade 1 tks ......gal.	.13½	.14	.13½	.14	.13½	.14
Grade 2 ....gal.	.122	.132	.122	.132	.122	.132
Cresol, USP, drs ....lb.	.10	.10½	.10	.10½	.10	.12½
Crotonaldehyde, 97%, 55 and 110 gal drs, delv .....lb.	...	.22	...	.22	.22	.30
Cutch, Philippine, 100 lb bale lb.	.04¼	.04½	.04¼	.04½	.04	.06
Cyanamid, bgs c-l, frt allowed Ammonia ....unit	...	1.15	...	1.15	...	1.15
D						
Derris root 5% rotenone, bbls ....lb.	.24	.30	.24	.30	.34	.43
Dextrin, corn, 140 lb bgs f.o.b., Chicago ....100 lb.	3.40	3.60	3.40	3.70	3.30	3.75
British Gum, bgs ....100 lb.	3.65	3.75	3.65	3.95	3.55	4.00
Potato, Yellow, 220 lb bgs lb.	.07	.07¾	.07	.08¾	.07¼	.08¾
White, 220 lb bgs, lcl lb.	.08	.09	.08	.09	.08	.09
Tapioca, 200 bgs, lcl .. lb.	...	.0715	...	.0715	.0715	.08
White, 140 lb bgs ...100 lb.	3.35	3.55	3.35	3.55	3.30	3.70
Diamylamine, c-l, drs, wks lb.	.47	.75	.47	.75	.47	.75
Diamylene, drs, wks ......lb.	.095	.102	.095	.102	.095	.102
tks, wks ....lb.	...	.08½	...	.08½	...	.08½
Diamylether, wks, drs ....lb.	.085	.092	.085	.092	.085	.092
tks, wks ....lb.	...	.075	...	.075	...	.075
Oxalate, lcl, drs, wks ..lb.	...	.30	...	.30	...	.30
Diamylphthalate, drs, wks lb.	.19	.19½	.19	.19½	.19	.21
Diamyl Sulfide, drs, wks lb.	...	1.10	...	1.10	...	1.10
Diatomaceous Earth, see Kieselguhr.						
Dibutoxy Ethyl Phthalate, drs, wks ....lb.	...	.35	...	.35	...	.35
Dibutylamine, lcl, drs, wks lb.	...	.55	...	.55	...	.55
Dibutyl Ether, drs, wks, lcl lb.	...	.25	...	.25	.25	.30
Dibutylphthalate, drs, wks, frt all'd ....lb.	.19	.19½	.19	.19½	.19	.21
Dibutyltartrate, 50 gal drs lb.	.45	.54	.45	.54	.45	.54
Dichlorethylene, drs ......lb.	...	.25	...	.25	...	.25
Dichloroethylether, 50 gal drs, wks ....lb.	.15	.16	.15	.16	.15	.16
tks, wks ....lb.	...	.14	...	.14	...	.14
Dichloromethane, drs, wks lb.	...	.23	...	.23	...	.23
Dichloropentanes, drs, wks lb.	no prices		no prices		...	...
tks, wks ....lb.	no prices		no prices		...	...
Diethanolamine, tks, wks ..lb.	...	.23	...	.23	...	.23
Diethylamine, 400 lb drs .lb.	2.75	3.00	2.75	3.00	2.75	3.00
Diethylaniline, 850 lb drs lb.	.40	.52	.40	.52	.40	.50
Diethyl Carbinol, drs ... lb.	.60	.75	.60	.75	.60	.75
Diethylcarbonate, com drs lb.	.31¾	.35	.31¾	.35	.31¾	.35
Diethylorthotoluidin, drs .lb.	.64	.67	.64	.67	.64	.67
Diethylphthalate, 1000 lb drs lb.	.19	.19½	.19	.19½	.19	.19½
Diethylsulfate, tech, drs, wks, lcl ....lb.	.13	.14	.13	.14	.13	.14
Diethyleneglycol, drs .....lb.	.16	.17	.16	.17	.16	.17
Mono ethyl ethers, drs .lb.	.15	.16	.15	.16	.15	.16
tks, wks ....lb.	...	.14	...	.14	...	.14
Mono butyl ether, drs..lb.	.23	.24	.23	.24	.23	.24
tks, wks ....lb.	...	.22	...	.22	...	.22
Diethylene oxide, 50 gal drs, wks ....lb.	.20	.24	.20	.24	.20	.24
Diglycol Oleate, bbls .....lb.	...	.13	.13	.20	...	.21
Laurate, bbls ....lb.	.16	.17	.16	.23	...	.27½
Stearate, bbls ....lb.	...	.24	.24	.28	...	.27½
Dimethylamine, 400 lb drs, pure 25 & 40% sol 100% basis ....lb.	...	1.00	...	1.00	...	1.00
Dimethylaniline, 340 lb drs lb.	.23	.24	.23	.24	.23	.27
Dimethyl Ethyl Carbinol, drs lb.	.60	.75	.60	.75	.60	.75
Dimethyl phthalate, drs, wks, frt allowed ....lb.	...	.19	...	.19	...	.19
Dimethylsulfate, 100 lb drs lb.	.45	.50	.45	.50	.45	.50
Dinitrobenzene, 400 lb bbls lb. *k*	.16	.19	.16	.19	.16	.19

k Higher price is for purified material.

**Dinitrochlorobenzene
Glauber's Salt**

Prices

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Dinitrochlorobenzene, 400 lb bbls ..... lb.	.13½	.14	.13½	.14	.13½	.14
Dinitronaphthalene, 350 lb bbls ..... lb.	.35	.38	.35	.38	.35	.38
Dinitrophenol, 350 lb bbls lb.	.23	.24	.23	.24	.23	.24
Dinitrotoluene, 300 lb bbls lb.	...	.15½	...	.15½	...	.15½
Diphenyl, bbls ..... lb.	.15	.25	.15	.25	.15	.25
Diphenylamine ..... lb.	.31	.32	.32	.32	.31	.32
Diphenylguanidine, 100 lb drs ..... lb.	.31	.32	.31	.32	.31	.32
Dip Oil, see Tar Acid Oil.						
Divi Divi pods, bgs shipmt ton	...	nom.	...	nom.	...	nom.
Extract ..... lb.	.05¾	.06¾	.05¾	.06¾	.05	.06¾
E						
Egg Yolk, dom., 200 lb cases lb.	.60	.63	.60	.69	.60	.69
Imported ..... lb.	...	nom.	...	nom.	.62	.68
Epsom Salt, tech, 300 lb bbls c-l, NY ..... 100 lb.	1.90	2.10	1.90	2.10	1.90	2.10
USP, c-l, bbls ..... 100 lb.	...	2.10	...	2.10	...	2.10
Ether, USP anaesthesia 55 lb drs ..... lb.	.22	.23	.22	.23	.22	.23
(Conc) ..... lb.	.09	.10	.09	.10	.09	.10
Isopropyl 50 gal drs ... lb.	.07	.08	.07	.08	.07	.08
tks, frt allowed ..... lb.	...	.06	...	.06	...	.06
Nitrous conc bottles ... lb.	...	.68	...	.68	...	.68
Synthetic, wks, drs ... lb.	.08	.09	.08	.09	.08	.09
Ethyl Acetate, 85% Ester tks, frt all'd ..... lb.	...	.051	...	.051	.051	.05½
drs, frt all'd ..... lb.	...	.061	...	.061	.061	.06½
99%, tks, frt all'd ... lb.	...	.0585	...	.0585	.0585	.06¾
drs, frt all'd ..... lb.	...	.0685	...	.0685	.0685	.07¾
Acetoacetate, 110 gal drs lb.	...	.27½	...	.27½	...	.27½
Benzylaniline, 300 lb drs lb.	.86	.88	.86	.88	.86	.88
Bromide, tech, drs ..... lb.	.50	.55	.50	.55	.50	.55
Cellullose, drs, wks, frt all'd ..... lb.	.45	.50	.45	.50	.45	1.00
Chloride, 200 lb drs ... lb.	.22	.24	.22	.24	.22	.24
Chlorocarbonate, cbys .. lb.	...	.30	...	.30	...	.30
Crotonate, drs ..... lb.	1.00	1.25	1.00	1.25	1.00	1.25
Formate, drs, frt all'd .. lb.	.27	.28	.27	.28	.27	.28
Lactate, drs, wks ..... lb.	...	.33	...	.33	...	.33
Oxalate, drs, wks ..... lb.	.30	.34	.30	.34	.30	.34
Oxybutyrate, 50 gal drs, wks ..... lb.	.30	.30½	.30	.30½	.30	.30½
Silicate, drs, wks ..... lb.	...	.77	...	.77	...	.77
Ethylene Dibromide, 60 lb drs ..... lb.	.65	.70	.65	.70	.65	.70
Chlorhydrin, 40%, 10 gal cbys chloro, cont ..... lb.	.75	.85	.75	.85	.75	.85
Anhydrous ..... lb.	...	.75	...	.75	...	.75
Dichloride, 50 gal drs, wks lb.	.0545	.0994	.0545	.0994	.0545	.0994
Glycol, 50 gal drs, wks .. lb.	.17	.21	.17	.21	.17	.21
tks, wks ..... lb.	...	.16	...	.16	...	.16
Mono Butyl Ether, drs, wks ..... lb.	.20	.21	.20	.21	.20	.21
tks, wks ..... lb.	...	.19	...	.19	...	.19
Mono Ethyl Ether, drs, wks ..... lb.	.16	.17	.16	.17	.16	.17
tks, wks ..... lb.	...	.15	...	.15	...	.15
Mono Ethyl Ether Acetate, drs, wks ..... lb.	...	.14	...	.14	...	.14
tks, wks ..... lb.	...	.13	...	.13	...	.13
Mono Methyl Ether, drs wks ..... lb.	.18	.22	.18	.22	.18	.22
tks, wks ..... lb.	...	.17	...	.17	...	.17
Oxide, cyl ..... lb.	.50	.55	.50	.55	.50	.55
Ethylideneaniline ..... lb.	.45	.47½	.45	.47½	.45	.47½
F						
Feldspar, blk pottery ..... ton	17.00	19.00	17.00	19.00	17.00	19.00
Powd, blk, wks ..... ton	14.00	14.50	14.00	14.50	14.00	14.50
Ferric Chloride, tech, crys, 475 lb bbls ..... lb.	.05	.07½	.05	.07½	.05	.07½
sol, 42° cbys ..... lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
Fish Scrap, dried, unground wks ..... unit *l*	...	no prices	...	no prices	2.75	3.30
Acid, Bulk, 6 & 3%, delv Norfolk & Baltimore basis ..... unit *m*	...	2.50	...	2.50	2.50	2.50
Fluorspar, 98% bgs ..... lb.	...	31.50	31.50	33.00	...	33.00
Formaldehyde, USP, 400 lb bbls, wks ..... lb.	.05¾	.06¼	.05¾	.06¼	.05¾	.06¼
Fossil Flour ..... lb.	.02½	.04	.02½	.04	.02½	.04
Fullers Earth, blk, mines ton	10.00	11.00	10.00	11.00	10.00	11.00
Imp powd, c-l, bgs ... ton	23.00	30.00	23.00	30.00	23.00	30.00
Furfural (tech) drs, wks lb.	.10	.15	.10	.15	.10	.15
Furfuramide (tech) 100 lb. drs ..... lb.	...	.30	...	.30	...	.30
Fusel Oil, 10% impurities lb.	.12½	.14	.12½	.14	.12½	.14
Fustic, crystals, 100 lb boxes ..... lb.	.22	.26	.22	.26	.22	.26
Liquid 50°, 600 lb bbls lb.	.09½	.13	.09½	.13	.09½	.13
Solid, 50 lb boxes ..... lb.	.17½	.19½	.17½	.19½	.17½	.19½
G						
G Salt paste, 360 lb bbls .. lb.	.45	.47	.45	.47	.45	.47
Gall Extract ..... lb.	.19	.20	.19	.20	.19	.20
Gambier, com 200 lb bgs lb.	.06¾	.07¾	.06¾	.07¾	.06¾	.07¾
Singapore cubes, 150 lb bgs ..... 100 lb.	.08½	.09	.08½	.09	.08½	.11
Gelatine, tech, 100 lb cs .. lb.	.45	.50	.45	.50	.45	.50
Glauber's Salt, tech, c-l, bgs, wks* ..... 100 lb.	.95	1.15	.95	1.15	.95	1.15
Anhydrous, see Sodium Sulfate						

l + 10; *m* + 50; *Bbls. are 20c higher.

Current

Glue, Bone
Hemlock

		Current Market		1939 Low	1939 High	1938 Low	1938 High
Glue, bone, com grades, c-l bgs	lb.	.11½	.13½	.11½	.13½	.13	.16½
Better grades, c-l, bgs	lb.	.15	.16½	.15	.16½	.14½	.16½
Glycerin, CP, 550 lb drs	lb.	...	.12½	...	.12½	.12½	.16
Dynamite, 100 lb drs	lb.	...	nom.	...	nom.	.12¾	.16
Saponification, drs	lb.	.09	.10	.08½	.10	.08½	.11¼
Soap Lye, drs	lb.	.07½	.07¾	.07½	.07¾	.07½	.10¼
Glyceryl Bori-Borate, bbls	lb.	...	.40	...	.40	...	.40
Monoricinoleate, bbls	lb.	...	.27	...	.27	...	.27
Monostearate, bbls	lb.	...	.30	...	.30	...	.30
Oleate, bbls	lb.	...	.22	...	.22	...	.22
Phthalate	lb.	...	.37	...	.37	...	.37
Glyceryl Stearate, bbls	lb.	...	.18	...	.18	...	.18
Glycol Bori-Borate, bbls	lb	...	.23	.23	.23	...	.26
Phthalate, drs	lb.	...	.39	.39	.40	...	.40
Stearate, drs	lb.	...	.25	.25	.27½	...	.27½
GUMS							
Gum Aloes, Barbadoes	lb	.85	.90	.85	.90	.85	.90
Arabic, amber sorts	lb.	.09	.09¼	.09	.09¼	.09	.12
White sorts, No. 1, bgs	lb.	23	.24	.23	.24	.23	.28
No. 2, bgs	lb.	21	.22	.21	.22	.21	.26
Powd, bbls	lb.	.12½	.14	.12½	.14	.12	.16
Asphaltum, Barbadoes (Manjak) 200 lb bgs, f.o.b., NY	lb.	.02½	.10½	.02½	.10½	.02½	.10½
California, f.o.b. NY, drs	ton	29.00	55.00	29.00	55.00	29.00	55.00
Egyptian, 200 lb cases, f.o.b. NY	lb.	.12	.15	.12	.15	.12	.15
Benzoin Sumatra, USP, 120 lb cases	lb.	.17	.18	.17	.21	.15	.25
Copal, Congo, 112 lb bgs, clean, opaque	lb.	...	.18¼	.18¼	.18¾	.18¾	.19¼
Dark amber	lb.	...	.07⅛	...	.07⅛	.07⅛	.08⅞
Light amber	lb.	...	.11¼	...	.11¼	.11¼	.13¼
Copal, East India, 180 lb bgs							
Macassar pale bold	lb.	...	.11⅜	...	.11⅜	.11⅜	.13
Chips	lb.	...	.05⅜	...	.05⅜	...	.05⅜
Dust	lb.	.03¼	.04	.03¼	.04	.03½	.04⅛
Nubs	lb.	...	.09½	...	.09½	.09⅛	.10⅜
Singapore, Bold	lb.	...	.14½	...	.14½	.14½	.15¼
Chips	lb.	...	.05⅝	.05⅝	.06½	.04¾	.05⅜
Dust	lb.	.03¼	.04	.03¼	.04	.03¼	.04⅛
Nubs	lb.	...	.10	...	.10	.10	.10⅜
Copal Manila, 180-190 lb baskets, Loba A	lb.	...	.10½	...	.10½	.10½	.12
Loba B	lb.	...	.09¾	.09¾	.10¼	.10¼	.11⅝
Loba C	lb.	...	.09	.09	.09¾	.09¾	.11¼
DBB	lb.	...	.07⅞	...	.07⅞	.07⅞	.08¾
Dust	lb.	...	.05⅛	...	.05⅛	.05⅛	.06⅝
MA sorts	lb.	...	.05⅞	...	.05⅞	.05⅞	.07¼
Copal Pontianak, 224 lb cases, bold genuine	lb.	...	.15¼	...	.15¼	.15¼	.16½
Chips	lb.	...	.07¾	.07¾	.08¼	.08¼	.10¼
Mixed	lb.	...	.14	...	.14		.14
Nubs	lb.	...	.10½	.10½	.11⅜	.11⅜	.12⅞
Split	lb.	...	.13⅛	.13⅛	.13½	.13½	.13⅞
Damar Batavia, 136 lb cases							
A	lb.	...	.20	...	.20	.20	.25½
B	lb.	...	.18½	...	.18½	.18½	.24
C	lb.	...	.14⅞	...	.14⅞	.14⅞	.20⅜
D	lb.	...	.13½	.13⅛	.13½	.13⅛	.17½
A/D	lb.	...	.14½	...	.14½	.14½	.20⅜
A/E	lb.	...	.12¼	...	.12¼	.12¼	.17¼
E	lb.	...	.07⅜	...	.07⅜	.07⅜	.08½
F	lb.	...	.07¼	...	.07¼	...	.07¼
Singapore, No. 1	lb.	...	.14	.14	.15¼	.15¼	.21⅛
No. 2	lb.	...	.10⅞	.10⅞	.11¼	.10⅜	.15⅜
No. 3	lb.	...	.05¼	...	.05¼	.05	.05¾
Chips	lb.	...	.09¼		.09¼	.09¼	.13½
Dust	lb.	...	.05⅜	.05¼	.05⅜	.05	.05¾
Seeds	lb.	...	.07⅜	...	.07⅜	.07⅜	.09½
Elemi, cns, c-l,	lb.	...	.08⅛	...	.08⅛	.08⅛	.09½
Ester	lb.	.06¼	.07	.06¼	.07	.06¼	.08½
Gamboge, pipe, cases	lb.	.55	.60	.55	.60	.60	.80
Powd, bbls	lb.	.60	.65	.60	.65	.65	.85
Ghatti, sol, bgs	lb.	.11	.15	.11	.15	.11	.15
Karaya, bbls, bxs, drs,	lb.	.14½	.23	.14½	.23	...	...
Kauri, NY							
Brown XXX, cases	lb.	.60	.60½	.60	.60½	.60	.60½
BX	lb.	...	.38	...	.38	...	.38
B1	lb.	...	.28	...	.28	...	.28
B2	lb.	...	.24	...	.24	...	.24
B3	lb.	...	.18½	...	.18½	...	.18½
Pale XXX	lb.	...	.61	...	.61	...	.61
No. 1	lb.	...	.41	...	.41	...	.41
No. 2	lb.	...	.24	...	.24	...	.24
No. 3	lb.	...	.17¾	...	.17¾	...	.17¾
Kino, tins	lb.	2.50	2.75	2.50	2.75	2.00	2.75
Mastic	lb.	.55	.56	.55	.56	.55	.56
Sandarac, prime quality, 200 lb bgs & 300 lb cks	lb.	.15	.19	.15	.20	.19	.26
Senegal, picked bags	lb.	.25	.27	.25	.27	.23	.27
Sorts	lb	.09¼	.09½	.09¼	.09½	.09¼	.12
Thus, bbls	280 lbs.	14.50	14.75	13.50	14.75	13.50	14.25
Tragacanth, No. 1, cases	lb.	2.25	2.35	2.25	2.45	2.40	3.00
No. 2	lb.	1.90	1.95	1.90	2.35	2.30	2.75
No. 3	lb.	1.60	1.65	1.60	1.95	1.90	2.70
Yacca, bgs	lb.	.03½	.04½	.03½	.04½	.03½	.04½
H							
Helium, cyl (200 cu. ft.)	cyl.	...	25.00	...	25.00	...	25.00
Hematine crystals, 400 lb bbls	lb.	.18	.34	.18	.34	.18	.34
Hemlock, 25%, 600 lb bbls. wks	lb.	.03	.03¼	.03	.03¼	.03	.03¼
tks	lb.	...	.02⅝	...	.02⅝	.02⅝	.02¾

Prices

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Hexalene, 50 gal drs, wks lb.	...	.30	...	.30	...	.30
Hexane, normal 60-70° C. Group 3, tks ......gal.	..	.10½	...	.10½	...	.10½
Hexamethylenetetramine, powd, drs ....lb.	.32	.33	.32	.36	.35	.36
Hexyl Acetate, secondary, delv, drs ....lb.	.13	.13½	.13	.13½	.13	.13½
tks ....lb.	...	.12	...	.12	...	.12
Hoof Meal, f.o.b. Chicago unit	...	2.85	...	2.85	2.35	3.35
Hydrogen Peroxide, 100 vol, 140 lb cbys ....lb.	.19½	.20	.19½	.20	.19½	.20
Hydroxylamine Hydrochloride ....lb.	...	3.15	...	3.15	...	3.15
Hypernic, 51°, 600 lb bbls lb.	.13	.16	.13	.21	.16	.21
I						
Indigo, Bengal, bbls .....lb.	...	2.40	...	2.40	...	2.40
Synthetic, liquid ......lb.	.16½	.19	.16½	.19	.16½	.19
Iodine, Resublimed, jars .lb.	...	1.75	...	1.75	1.50	1.75
Irish Moss, ord, bales ...lb.	.10	.11	.10	.11	.10	.11
Bleached, prime, bales lb.	.19	.20	.19	.20	.19	.20
Iron Acetate Liq. 17°, bbls delv ....lb.	.03	.04	.03	.04	.03	.04
Chloride see Ferric Chloride.						
Nitrate, coml, bbls...100 lb.	2.32	3.11	2.32	3.11	2.32	3.11
Isobutyl Carbinol (128-132° C) drs, wks ....lb.	.33	.34	.33	.34	.33	.34
tks, wks lb.	...	.32	...	.32	...	.32
Isopropyl Acetate, tks, frt all'd ....lb.	...	.0510	...	.0510	.0510	.05½
drs, frt all'd lb.	.061	.066	.061	.066	.061	.07
Ether, see Ether, isopropyl.						
Keiselguhr, dom bags, c-l, Pacific Coast ....ton	22.00	85.00	22.00	85.00	22.00	85.00
L						
Lead Acetate, f.o.b. NY, bbls, White, broken ......lb.	...	.10	...	.10	.10	.11
cryst, bbls ....lb.	...	.10	...	.10	.10	.11
gran, bbls ....lb.	...	.10¾	...	.10¾	.10¾	.11¾
powd, bbls ....lb.	...	.10¾	...	.10¾	.10¾	.11¾
Arsenate, East, drs ...lb.	.11	.11½	.11	.11½	.11	.13½
Linoleate, solid, bbls...lb.	...	.19	...	.19	...	.19
Metal, c-l, NY .....100 lb.	...	5.10	...	5.10	4.00	5.10
Nitrate, 500 lb bbls, wks lb.	.10	.11½	.10	.11½	.10	.11½
Oleate, bbls ....lb.	.18½	.20	.18½	.20	.18½	.20
Red, dry, 95% Pb_2O_4, delv ....lb.	...	.0735	.07¼	.08	.06½	.08
97% Pb_2O_4, delv ...lb.	...	.076	.07½	.076	.06¾	.081
98% Pb_2O_4, delv ...lb.	...	.0785	.07¾	.0785	.07	.0835
Resinate, precip, bbls ..lb.	...	.16½	...	.16½	...	.16½
Stearate, bbls ....lb.	.22	.23	.22	.23	.22	.23
Titanate, bbls, c-l, f.o.b. wks, frt all'd ......lb.	.11	.11½	.11	.11½	.11	.11½
White, 500 lb bbls, wks lb.	...	.07	...	.07	.06	.07
Basic sulfate, 500 lb bbls, wks ....lb.	...	.06¼	...	.06¼	.05¼	.06¼
Lime, chemical quicklime, f.o.b., wks, bulk ...ton	7.00	8.00	7.00	8.00	7.00	8.00
Hydrated, f.o.b. wks...ton	8.50	12.00	8.50	12.00	8.50	12.00
Lime Salts, see Calcium Salts						
Lime sulfur, dealers, tks..gal.	.08	.11½	.08	.11½	.08	.11½
drs ....gal.	.11	.16	.11	.16	.11	.16
Linseed Meal, bgs ......ton	40.00	40.50	40.00	42.00	39.00	45.00
Litharge, coml, delv, bbls.lb.	...	.0635	.06¼	.0635	.05½	.066
Lithopone, dom, ordinary, delv, bgs ....lb.	...	.04⅛	...	.04⅛	.04⅛	.04⅝
bbls ....lb.	...	.04⅜	...	.04⅜	.04⅜	.04⅞
High strength, bgs ....lb.	...	.05⅝	...	.05⅝	.05⅝	.06⅛
bbls ....lb.	...	.05⅞	...	.05⅞	.05⅞	.06⅜
Titanated, bgs ....lb.	...	.05⅝	...	.05⅝	.05⅝	.06⅛
bbls ....lb	...	.05⅞	...	.05⅞	.05⅞	.06⅜
Logwood, 51°, 600 lb bbls lb.	.09½	.11½	.09½	.11½	.09½	.11½
Solid, 50 lb boxes .....lb.	.15	.19	.15	.19	.15	.19
Sticks ....ton	24.00	25.00	24.00	25.00	24.00	25.00
M						
Madder, Dutch ....lb.	.22	.25	.22	.25	.22	.25
Magnesite, calc, 500 lb bbls ton	60.00	65.00	60.00	65.00	60.00	65.00
Magnesium Carb, tech, 70 lb bgs, wks ....lb.	.05¾	.06½	.05¾	.06½	.05¾	.07
Chloride flake, 375 lb drs, c-l, wks ....ton	39.00	42.00	39.00	42.00	39.00	42.00
Fluosilicate, crys, 400 lb bbls, wks ....lb.	.10	.10½	.10	.10½	.10	.10½
Oxide, calc tech, heavy bbls, frt all'd ..lb.	.25	.30	.25	.30	.25½	.30½
Light, bbls above basis lb.	.20	.25	.20	.25	.20	.25½
USP Heavy, bbls, above basis ....lb.	.25	.30	.25	.30	.25	.30½
Palmitate, bbls ..... lb.	.33	nom.	.33	nom.	...	.33
Silicofluoride, bbls lb	.09½	.10½	.09½	.10½	.09½	.10½
Stearate, bbls ....lb.	.21	.24	.21	.24	.21	.24
Manganese acetate, drs...lb.	...	.26½	...	.26½	...	.26½
Borate, 30%, 200 lb bbls lb.	.15	.16	.15	.16	.15	.16
Chloride, 600 lb cks lb.	.09	.12	.09	.12	.09	.12
Dioxide, tech (peroxide), paper bags, c-l ......ton	...	47.50	...	47.50	47.50	62.50
Hydrate, bbls ....lb.	...	.32	...	.32	...	.32
Linoleate, liq, drs .... lb.	.18	.19¼	.18	.19¼	.18	.19¼
solid, precip, bbls ...lb	...	.19	...	.19	...	.19
Resinate, fused, bbls ...lb	.08¼	.08½	.08¼	.08½	.08¼	.08½
precip, drs ....lb.	...	.12	...	.12	...	.12
Sulfate, tech, anhyd, 90-95%, 550 lb drs ...lb.	.07	.07½	.07	.07½	.07	.07½

	Current Market		1939		1938	
			Low	High	Low	High
Mangrove, 55%, 400 lb bbls lb.	...	.04	...	.04	..	.04
Bark, African ....ton	...	23.25	23.00	23.25	23.00	24.50
Mannitol, pure cryst, cs.wks lb.	...	1.05	1.05	1.20	1.15	1.45
commercial grd, 250 lb bbl ....lb.	.46	.57	...	...	...	...
Marble Flour, blk ......ton	12.00	13.00	12.00	13.00	12.00	13.00
Mercury chloride(Calomel) lb.	...	1.44	1.36	1.44	1.18	1.59
Mercury metal 76 lb. flasks	90.00	93.00	80.00	93.00	73.00	84.50
Mesityl Oxide, f.o.b. dest.,						
tks. ....lb.	...	.10½	.10½	.20	...	...
drs, c.l. ....lb.	...	.11½	.11½	.21	...	...
drs, l.c.l. ....lb.		.12	.12	.21½		
Meta-nitro-aniline ......lb.	.67	.69	.67	.69	.67	.69
Meta-nitro-paratoluidine 200 lb bbls ....lb.	1.45	1.55	1.45	1.55	1.45	1.55
Meta-phenylene diamine 300 lb bbls ....lb.	.80	.84	.80	.84	.80	.84
Meta-toluene-diamine 300 lb bbls ....lb.	.65	.67	.65	.67	.65	.67
Methanol, denat, grd, drs, c-l,						
frt all'd ....gal.	...	.46	.41	.46	.30	.41
tks, frt all'd ......gal.	...	.40	.35	.40	.25	.35
Pure, drs, c-l, frt all'd gal.	...	38	...	.38	...	.38
tks ....gal.	...	.33	..	.33	...	.33
95%, tks ....gal.	...	.31	...	.31	...	.31
97%, tks ....gal.	...	.32	..	.32	...	.32
Methyl Acetate, tech, tks,						
delv ....lb.		.06½		.06½	...	.06½
55 gal drs, delv ....lb.	.07½	.08	.07½	.08	.07½	.08
C.P. 97-99%, tks, delv lb.	..	.06¼	...	.06¼	.06¼	.07
55 gal drs, delv ....lb.	.07¼	.07¾	.07¼	.07¾	.07¼	.08½
Acetone, frt all'd, drs gal. *p*	.30	.36	.30	.36	.30	.40½
tks, frt all'd, drs gal. *p*	.25	.29	.25	.29	.25	.32½
Synthetic, frt all'd,						
east of Rocky M.,						
drs ....gal. *p*	.38	.41	.38	.41	.38	.51
tks, frt all'd ...gal.	...	.31½	...	.31½	.31½	.39½
West of Rocky M.,						
frt all'd, drs ..gal. *p*	...	.42	...	.42	.42	.46
tks, frt all'd...gal. *p*	...	.35	...	.35	.35	.39½
Anthraquinone ....lb.	...	.83	...	.83	...	.83
Butyl Ketone, tks .....lb.	...	.10½	...	.10½	...	.10½
Chloride, 90 lb cyl ....lb.	.32	.40	.32	.40	.32	.40
Ethyl Ketone, tks, frt all'd lb.	...	.05	...	.05	.05	.06
50 gal drs, frt all'd c-l lb.	...	.06	...	.06	.06	.07
Formate, drs, frt all'd ..lb.	.35	.36	.35	.36	.35	.36
Hexyl Ketone, pure, drs lb.	...	.60	...	.60	...	.60
Lactate, drs, frt all'd ..lb.	...	.30	...	.30	...	.30
Propyl carbinol, drs ...lb.	.60	.75	.60	.75	.60	.75
Mica, dry grd, bgs, wks ..lb.	...	30.00	...	30.00	30.00	35.00
Michler's Ketone, kgs ...lb.	...	2.50	...	2.50	...	2.50
Monoamylamine, c-l,drs,wks lb.	.52	1.00	.52	1.00	.52	1.00
Monobutylamine, lcl, drs, wks ....lb.	...	.65	...	.65	...	.65
Monochlorobenzene, see Chlorobenzene, mono						
Monoethanolamine, tks, wks lb.	...	.23	...	.23	...	.23
Monomethylamine, drs, frt all'd, E. Mississippi, c-l lb.	...	.65	...	.65	...	.65
Monomethylparaminosulfate, 100 lb drs ....lb.	3.75	4.00	3.75	4.00	3.75	4.00
Myrobalans 25%, liq bbls lb.	.03¾	.04¼	.03¾	.04¼	.03¾	.04¼
50% Solid, 50 lb boxes lb.	.04¼	.05	.04¼	.05	.04⅜	.06¼
J1 bgs ....ton	...	24.00	24.00	25.00	23.50	30.00
J2 bgs ....ton	...	17.00	...	17.00	17.00	22.00
R2 bgs ....ton	...	17.25	...	17.25	17.00	22.00
N						
Naphtha, v.m.&p. (deodorized) see petroleum solvents.						
Naphtha, Solvent, water-white,						
tks ....gal.	...	.26	..	.26	.26	.31
drs, c-l ....gal.	...	.31	...	.31	.31	.36
Naphthalene, dom, crude bgs,						
wks ....lb.	2.25	2.85	2.25	2.85	2.25	2.85
Imported, cif, bgs ...lb.	...	1.50	1.50	1.85	1.40	2.25
Balls, flakes, pks ......lb.	...	.06½	...	.06½	.06½	.08
Balls, ref'd, bbls, wks ..lb.	...	.05¾	...	.05¾	.05¾	.07¼
Flakes, ref'd, bbls, wks lb.	...	.05¾	...	.05¾	.05¾	.07¼
Nickel Carbonate, bbls ..lb.	.36	.37½	.36	.37½	.36	.37½
Chloride, bbls ....lb.	.18	.20	.18	.20	.18	.20
Metal ingot ....lb.	...	.35	...	.35	...	.35
Oxide, 100 lb kgs, NY lb.	.35	.37	.35	.37	.35	.37
Salt, 400 lb bbls, NY lb.	.13	.13½	.13	.13½	.13	.13½
Single, 400 lb bbls, NY lb.	.13	.13½	.13	.13½	.13	.13½
Nicotine, 40%, drs, sulfate, 55 lb drs ....lb.	...	.76	...	.76	...	.76
Nitre Cake, blk ....ton	...	16.00	...	16.00	...	16.00
Nitrobenzene, redistilled, 1000						
lb drs, wks ....lb.	.08	.10	.08	.10	.08	.10
tks ....lb.	...	.07½	...	.07½	...	.07½
Nitrocellulose, c-l, l-c-l, wks lb.	.22	.29	.22	.29	.22	.29
Nitrogen Sol. 45½% ammon., f.o.b. Atlantic & Gulf ports						
tks, unit ton	...	1.04	.	1.04	1.01	1.04
Nitrogenous Mat'l, bgs, imp unit	.	2.45	2.45	2.50	2.35	2.65
dom, Eastern wks ...unit	.	2.45	2.45	2.50	2.50	2.75
dom, Western wks ...unit		2.00	2.00	2.25	2.20	2.35
Nitronaphthalene, 550 lb bbls lb.	.24	.25	.24	.25	.24	.25
Nutgalls Alleppo, bgs ...lb.	.	.23	..	.23	.23	.23
O						
Oak Bark Extract, 25%, bbls lb.	...	.03½	.03⅛	.03½	...	.03⅛
tks ....lb.	..	.02¾	...	.02¾	..	.02¾
Octyl Acetate, tks, wks ...lb.	.16	.17	.16	.17	.16	.17

a Country is divided in 4 zones, prices varying by zone; *p* Country is divided into 4 zones. Also see footnote directly above; *q* Naphthalene quoted on Pacific Coast F.A S. Phila., or N. Y.

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Orange-Mineral, 1100 lb cks NY ....lb.	...	.10¼	...	.10¼	.09½	.10½
Orthoaminophenol, 50 lb kgs lb.	2.15	2.25	2.15	2.25	2.15	2.25
Orthoanisidine, 100 lb drs lb.	.70	.74	.70	.74	.70	.74
Orthochlorophenol, drs ...lb.	...	.32	...	.32	.32	.75
Orthocresol, drs, wks ....lb.	.16½	.17½	.16½	.17½	.13½	.17½
Orthodichlorobenzene, 1000 lb drs .... lb.	.06	.07	.06	.07	.06	.07
Orthonitrochlorobenzene, 1200 lb drs, wks ....lb.	.15	.18	.15	.18	.15	.18
Orthonitroparachlorphenol, tins ....lb.	...	.75	...	.75	...	.75
Orthonitrophenol, 350 lb drs ....lb.	.85	.90	.85	.90	.85	.90
Orthonitrotoluene, 1000 lb drs. wks ....lb.	.08	.10	.08	.10	.08	.10
Orthotoluidine, 350 lb bbls, l-c-l ....lb.	.16	.17	.16	.17	.16	.17
Osage Orange, cryst, bbls lb.	.17	.25	.17	.25	.17	.25
51° liquid ....lb.	.07	.08	.07	.08	.07	.08
P						
Paraffin, rfd, 200 lb bgs						
122-127° M P ....lb.	.03¾	.039	.03¾	.039	.03¾	.04½
128-132° M P ....lb.	.04	.0435	.04	.0435	.04	.049
133-137° M P ....lb.	...	.0465	...	.0465	.0465	.05¾
Para aldehyde, 99%, tech, 110-55 gal drs, delv. .lb.	...	.16	...	.16	.16	.18
Aminoacetanilid, 100 lb kgs ....lb.	...	.85	...	.85	...	.85
Aminohydrochloride, 100 lb kgs ....lb.	1.25	1.30	1.25	1.30	1.25	1.30
Aminophenol, 100 lb kgs lb.	...	1.05	...	1.05	...	1.05
Chlorophenol, drs .....lb.	.30	.45	.30	.45	.30	.45
Dichlorobenzene, 200 lb drs, wks ....lb.	.11	.12	.11	.12	.11	.12
Formaldehyde, drs, wks lb.	.34	.35	.34	.35	.34	.35
Nitroacetanilid, 300 lb bbls ....lb.	.45	.52	.45	.52	.45	.52
Nitroaniline, 300 lb bbls, wks ....lb.	.45	.47	.45	.47	.45	.47
Nitrochlorobenzene, 1200 lb drs, wks ....lb.	.15	.16	.15	.16	.15	.16
Nitro-orthotoluidine, 300 lb bbls ....lb.	2.75	2.85	2.75	2.85	2.75	2.85
Nitrophenol, 185 lb bbls lb.	.35	.37	.35	.37	.35	.37
Nitrosodimethylaniline, 120 lb bbls ....lb.	.92	.94	.92	.94	.92	.94
Nitrotoluene, 350 lb bbls lb.	...	.35	...	.35	...	.35
Phenylenediamine, 350 lb bbls ....lb.	1.25	1.30	1.25	1.30	1.25	1.30
Toluenesulfonamide, 175 lb bbls. ....lb.	.70	.75	.70	.75	.70	.75
tks, wks ....lb.	...	.31	...	.31	...	.31
Toluenesulfonchloride, 410 lb bbls, wks ....lb.	.20	.22	.20	.22	.20	.22
Toluidine, 350 lb bbls, wks ....lb	.56	.58	.56	.58	.56	.58
Paris Green, dealers, drs lb.	.23	.26	.23	.26	.23	.26½
Pentane, normal, 28-38° C, group 3, tks ....gal.	...	.08½	...	.08½	...	.08½
drs, group 3 ....gal.	.11½	.16	.11½	.16	.11½	.16
Perchlorethylene, 100 lb drs, frt all'd ....lb.	...	.10½	...	.10½	...	.10½
Petrolatum, dark amber, bbls ....lb.	.02⅝	.02¾	.02⅝	.02¾	.02⅝	.03⅞
Light, bbls ....lb.	.03⅛	.03⅜	.03⅛	.03⅜	.03⅛	.03⅜
Medium, bbls ....lb.	.02⅞	.03⅛	.02⅞	.03⅛	.02⅞	.03⅛
Dark green, bbls ....lb.	.02½	.02¾	.02½	.02¾	.02½	.02¾
Red, bbls ....lb.	.02½	.03⅝	.02½	.03⅝	.02½	.03⅝
White, lily, bbls ....lb.	.05¼	.07⅛	.05¼	.07⅛	.05¼	.07⅛
White, snow, bbls ....lb.	.06¼	.08⅛	.06¼	.08⅛	.06¼	.08⅛
Petroleum Ether, 30-60°, group 3, tks ....gal.	...	.13	...	.13	...	.13
drs, group 3 ....gal.	.14	.17	.14	.17	.14	.17
PETROLEUM SOLVENTS AND DILUENTS						
Cleaners naphthas, group 3. tks, wks ....gal.	.06⅜	.06⅝	.06⅜	.06⅝	.06⅜	.07⅜
East Coast, tks, wks gal	...	.10	...	.10	...	.10
Hydrogenated, naphthas, frt all'd East, tks .....gal.	...	.16	...	.16	...	.16
No. 2, tks ....gal.	...	.18	...	.18	...	.18
No. 3, tks ....gal.	...	.16	...	.16	...	.16
No. 4, tks ....gal.	...	.18	...	.18	...	.18
Lacquer diluents, tks, Bayonne ....gal.	.12	.12½	.12	.12½	.12	.12½
Group 3, tks ....gal.	.07⅜	.07⅝	.07⅜	.07⅝	.07⅜	.08⅜
Naphtha, V.M.P., East, tks wks ....gal.	...	.10	.10	.10	.09½	.10
Group 3, tks, wks ..gal.	.06⅜	.06⅝	.06⅜	.06⅝	.06⅜	.07⅜
Petroleum thinner, 43-47, East, tks, wks .....gal	.09½	.10	.09½	.10	.08½	.10
Group 3, tks, wks ..gal.	.05⅜	.05⅝	.05⅜	.05⅝	.05⅜	.06⅜
Rubber Solvents, stand grd East, tks, wks .....gal.	.09½	.10	.09½	.10	.09½	.10
Group 3 tks, wks ...gal.	.06⅜	.06⅝	.06⅜	.06⅝	.06⅜	.07⅜
Stoddard Solvent, East, tks, wks ....gal	...	.10	...	.10	.09½	.10
Group 3, tks, wks ..gal.	.05⅞	.06⅛	.05⅞	.06⅛	.05⅞	.06⅞
Phenol, 250-100 lb drs ...lb.	.14½	.15½	.14½	.15½	.14½	.15½
tks, wks ....lb	...	.13½	...	.13½	...	.13½
Phenyl-Alpha-Naphthylamine, 100 lb kgs ....lb.	...	1.35	...	1.35	...	1.35
Phenyl Chloride, drs .... lb.	...	.17	...	.17	...	.17
Phenylhydrazine Hydrochloride, com ....lb.	...	1.50	...	1.50	...	1.50

Current

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Phloroglucinol, tech, tins . . lb.	15.00	16.50	15.00	16.50	15.00	16.50
CP, tins . . . lb.	20.00	22.00	20.00	22.00	20.00	22.00
Phosphate Rock, f.o.b. mines						
Florida Pebble, 68% basis ton	. . .	1.85	. . .	1.85	. . .	1.85
70% basis . . . ton	. .	2.35	. . .	2.35	. . .	2.35
72% basis . . . ton	. . .	2.85	. . .	2.85	. . .	2.85
75-74% basis . . . ton	. . .	3.85	. . .	3.85	. . .	3.85
75% basis . . . ton	. . .	5.50	. . .	5.50	. . .	5.50
Tennessee, 72% basis . . ton	. . .	4.50	. . .	4.50	. . .	4.50
Phosphorus Oxychloride 175 lb cyl . . . lb.	.16	.20	.16	.20	.16	.20
Red, 110 lb cases . . . lb.	40	.44	.40	.44	.40	.44
Sesquisulfide, 100 lb cs . . lb.	.38	.44	.38	.44	.38	.44
Trichloride, cyl . . . lb.	.15	.18	.15	.18	.15	.18
Yellow, 110 lb cs, wks . lb.	.24	.30	.24	.30	.24	.30
Phthalic Anhydride, 100 lb drs, wks . . . lb.	. . .	.14½	. . .	.14½	. . .	.14½
Pine Oil, 55 gal drs or bbls						
Destructive dist . . . lb.	46	.48	.46	.48	.46	.55
Steam dist wat wh bbls gal.	. .	.59	. . .	.59	. . .	.59
tks . . . gal.	. . .	.54	. . .	.54	. . .	.54
Pitch Hardwood, wks . . . ton	18.25	18.75	18.25	18.75	18.25	18.75
Coaltar, bbls, wks . . . ton	. .	19.00	. . .	19.00	. .	19.00
Burgundy, dom, bbls, wks lb.	.05½	.06½	.05½	.06½	.05½	.06½
Imported . . . lb.	.15	.16	.15	.16	.15	.16
Petroleum, see Asphaltum in Gums' Section.						
Pine, bbls . . . bbl.	6.00	6.25	6.00	6.25	5.75	6.25
Stearin, drs . . . lb.	.03	.04½	.03	.04½	.03	.04½
Platinum, ref'd . . . oz.	32.00	35.00	32.00	35.00	30.00	39.00
POTASH						
Potash, Caustic, wks, sol . . lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
flake . . . lb.	.07	.07⅜	.07	.07⅜	.07	.07⅜
Liquid, tks . . . lb.	. . .	.02⅞	. . .	.02⅞	. . .	.02⅞
Manure Salts, imported 30% basis, blk . . . unit	. . .	.58½	. . .	.58½	. . .	.58½
Potassium Abietate, bbls . . lb.	. . .	.09	. . .	.09	.08	.13
Acetate, tech, bbls, delv lb.	. . .	.26	. . .	.26	.26	.28
Bicarbonate, USP, 320 lb bbls . . . lb.	. . .	.18	. . .	.18	. . .	.18
Bichromate Crystals, 725 lb cks* . . . lb.	.08¾	.09¼	.08¾	.09¼	.08¾	.09¼
Binoxalate, 300 lb bbls . . lb.	. . .	.23	. . .	.23	. . .	.23
Bisulfate, 100 lb kgs . . . lb.	.15½	.18	.15½	.18	.15½	.18
Carbonate, 80-85% calc 800 lb cks . . . lb.	.06½	.07	.06½	.07	.06½	.07
liquid, tks . . . lb.	. . .	.02⅞	. . .	.02⅞	. . .	.02⅞
drs, wks . . . lb.	.03	.03½	.03	.03½	.03	.03½
Chlorate crys, 112 lb kgs, wks . . . lb.	.09¼	.09½	.09¼	.09½	.09¼	.09½
gran, kgs . . . lb.	.12	.13	.12	.13	.12	.13
powd, kgs . . . lb.	.08½	.08¾	.08½	.08¾	.08½	.08¾
Chloride, crys, bbls . . . lb.	.04	.04¾	.04	.04¾	.04	.04¾
Chromate, kgs . . . lb.	.19	.28	.19	.28	.19	.28
Cyanide, 110 lb cases . . . lb.	.50	.55	.50	.55	.50	.57½
Iodide, 250 lb bbls . . . lb.	. . .	1.13	. . .	1.13	.93	1.13
Metabisulfite, 300 lb bbls lb.	.12	.13½	.12	.13½	.12	.15
Muriate, bgs, dom, blk unit	. . .	.53½	. . .	.53½	. . .	.53½
Oxalate, bbls . . . lb.	.25	.26	.25	.26	.25	.26
Perchlorate, kgs, wks . . . lb.	.09	.10½	.09	.10½	.09	.11½
Permanganate, USP, crys, 500 & 1000 lb drs, wks lb.	.18½	.19½	.18½	.19½	.18½	.19½
Prussiate, red, bbls . . . lb.	.30½	.34	.30½	.34	.30½	.37
Yellow, bbls . . . lb.	.14	.15	.14	.16	.15	.16
Sulfate, 90% basis, bgs ton	. . .	38.00	. . .	38.00	. . .	38.00
Titanium Oxalate, 200 lb bbls . . . lb.	.35	.40	.35	.40	.35	.40
Pot & Mag Sulfate, 48% basis bgs . . . ton	. . .	25.75	. . .	25.75	. . .	25.75
Propane, group 3, tks . . . lb.	.03	.04⅜	.03	.04⅜	.03	.04⅜
Putty, coml, tubs . . . 100 lb.	. . .	3.00	. . .	3.00	2.25	3.00
Linseed Oil, kgs . . . 100 lb.	. . .	4.50	. . .	4.50	4.00	4.65
Pyrethrum, conc liq:						
2.4% pyrethrins, drs, frt all'd . . . gal.	6.25	6.35	5.75	6.35	5.00	6.75
3.6% pyrethrins, drs, frt all'd . . . gal.	9.20	9.35	8.45	9.35	7.65	9.95
Flowers, coarse, Japan, bgs . . . lb.	.29	.29½	.26	.29½	.18	.28½
Fine powd, bbls . . . lb.	.30	.31	.27	.31	.19	.30
Pyridine, denat, 50 gal drs gal.	. . .	1.63	. . .	1.63	1.53	1.63
Refined, drs . . . lb.	. . .	.50	. . .	.50	.45	.50
Pyrites, Spanish cif Atlantic ports, blk . . . unit	.12	.13	.12	.13	.12	.13
Pyrocatechin, CP, drs, tins lb.	2.15	2.75	2.15	2.75	2.15	2.75
Q						
Quebracho, 35% liq tks . . lb.	. . .	.02⅞	.02⅞	.03⅜	.03	.03⅜
450 lb bbls, c-l . . . lb.	. . .	.04	.04	.04⅛	.03½	.04⅛
Solid, 63%, 100 lb bales cif . . . lb.	. . .	.04	. . .	.04	. . .	.04
Clarified, 64%, bales . lb.	. . .	.04¼	. . .	.04¼	. . .	.04¼
Quercitron, 51 deg liq, 450 lb bbls . . . lb	.07½	.08½	.07½	.08½	.06	.08½
Solid, drs . . . lb.	.10	.12	.10	.12	.10	.12
R						
R Salt, 250 lb bbls, wks . lb.	.52	.55	.52	.55	.52	.55
Resorcinol tech, cans . . . lb.	.75	.80	.75	.80	.75	.80
Rochelle Salt, cryst . . . lb.	.18¾	.19¼	.17¾	.19¼	.15	.18¼
Powd, bbls . . . lb.	.17¾	.18¼	.16¾	.18¼	.16	.18½
Rosin Oil, bbls, first run gal.	.45	.47	.45	.47	.45	.60
Second run . . . gal.	.47	.49	.47	.49	.47	.62
Third run, drs . . . gal.	.51	.53	.51	.53	.51	.66

* Spot price is ⅛c higher.

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Rosins 600 lb bbls, 280 lb unit ex. yard NY:***						
B	...	4.90	4.90	5.10	4.65	6.00
D	...	5.15	5.15	5.30	4.75	6.00
E	...	5.40	5.35	5.40	4.90	6.00
F	...	5.70	5.65	5.70	5.05	7.00
G	...	6.60	5.75	6.60	5.25	7.05
H	...	6.70	5.75	6.70	5.25	7.15
I	...	6.70	5.77½	6.70	5.25	7.15
K	...	6.80	5.80	6.80	5.25	7.25
M	...	6.80	5.90	6.80	5.25	7.40
N	...	6.90	6.90	7.10	6.20	7.50
WG	...	7.40	7.30	7.40	6.75	8.45
WW	...	8.05	7.95	8.05	7.55	9.15
Rosins, Gum, Savannah (280 lb unit):**						
B	...	3.50	3.50	3.75	3.25	4.60
D	...	3.75	3.75	4.00	3.50	4.60
E	...	4.00	3.95	4.10	3.55	4.60
F	...	4.30	4.25	4.30	3.90	5.60
G	...	5.20	4.40	5.20	4.10	5.65
H	...	5.30	4.40	5.30	4.20	5.75
I	...	5.30	4.40	5.30	4.20	5.85
K	...	5.40	4.40	5.40	4.20	6.00
M	...	5.40	4.40	5.40	4.20	6.15
N	...	5.50	5.35	5.70	4.80	6.20
WG	...	6.00	5.80	6.00	5.40	7.05
WW	...	6.65	6.30	6.65	6.10	7.75
X	...	6.65	6.30	6.65	6.10	7.75
Rosin, Wood, c-l, FF grade, NY	4.00	5.10	5.35	5.25	5.05	6.40
Rotten Stone, bgs mines . . ton	25.50	37.50	22.50	37.50	22.50	35.00
Imported, lump, bbls . . lb.	...	.14	...	.14	.12	.14
Powdered, bbls . . . . . . lb.	.08½	.10	.08½	.10	.08½	.10

S

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Sago Flour, 150 lb bgs . . lb.	.02½	.03½	.02½	.03½	.02½	.03¾
Sal Soda, bbls, wks . . . 100 lb.	...	1.20	...	1.20	...	1.20
Salt Cake, 94-96%, c-l, wks ton	19.00	25.00	19.00	25.00	19.00	23.00
Chrome, c-l, wks . . . . . ton	11.00	12.00	11.00	12.00	11.00	12.00
Saltpetre, gran, 450-500 lb bbls . . . . . lb.	.06½	.069	.06½	.069	.06½	.069
Cryst, bbls . . . . . lb.	.07½	.0865	.07½	.0865	.07½	.0865
Powd, bbls . . . . . lb.	.07½	.079	.07½	.079	.07½	.079
Satin, White, pulp, 550 lb bbls . . . . . lb.	.01¼	.01½	.01¼	.01½	.01¼	.01½
Schaeffer's Salt, kgs . . lb.	.46	.48	.46	.48	.46	.48
Shellac, Bone dry, bbls lb. r	.19	.20	.19	.20	.16½	.20
Garnet, bgs . . . . lb.	.12½	.13	.12½	.13	.12½	.15
Superfine, bgs . . . . lb. s	.11	.11½	.11	.11½	.11	.13½
T. N., bgs . . . . . lb. s	.10½	.11	.10½	.11	.10½	.12½
Silver Nitrate, vials . . . . oz.	.31½	.33½	.31½	.33½	.33½	.34⅞
Slate Flour, bgs, wks . . . ton	9.00	10.00	9.00	10.00	9.00	10.00
Soda Ash, 58% dense, bgs, c-l, wks . . . . . 100 lb.	...	1.10	..	1.10	...	1.10
58% light, bgs . . . . 100 lb.	...	1 08	...	1.08	...	1.08
blk . . . . . 100 lb.	...	.90	...	.90	...	.90
paper bgs . . . . . 100 lb.	...	1.05	...	1.05	...	1 05
bbls . . . . . 100 lb.	...	1.35	...	1.35	...	1.35
Caustic, 76% grnd & flake, drs . . . . . 100 lb.	...	2.70	...	2.70	...	2.70
76% solid, drs . . . . 100 lb.	...	2.30	...	2.30	...	2.30
Liquid sellers, tks . . 100 lb.	...	1.97½	...	1.97½		1.97½
Sodium Abietate, drs . . lb.	...	.11	...	.11	.10	.13
Acetate, 60% tech, gran, powd, flake, 450 lb bbls wks . . . . . lb.	.04	.05	.04	.05	.04	.05
anhyd, drs, delv . . . . lb	...	.08¼	...	.08¼		.08¼
Alginate, drs . . . . . lb.		.70		.70	.69	.70
Antimoniate, bbls . . . . . lb.	.11½	.12	.11½	.12½	.12	.15¼
Arsenate, drs . . . . . lb.	.08	.08½	.08	.08½	.08	.08½
Arsenite, liq, drs . . . . gal.		.35	.30	.35	.30	.33
Dry, gray, drs, wks . . lb.	.07½	.09½	.07½	.09½	.07½	.09½
Benzoate, USP kgs . . . lb.	.46	.48	.46	.48	.46	.48
Bicarb, powd, 400 lb bbl, wks . . . . . 100 lb.	...	1.85	...	1.85	...	1.85
Bichromate, 500 lb cks, wks*	.06¾	.07¼	.06¾	.07¼	.06¾	.07¼
Bisulfite, 500 lb bbls, wks lb.	.03¼	.036	.03¼	.036	.03¼	.036
35-40% sol bbls, wks 100 lb.	1.40	1.80	1.40	1 80	1.40	1.80
Chlorate, bgs, wks . . . . lb.	.06¼	.07½	.06¼	.07½	.06¼	.07½
Cyanide, 96-98%, 100 & 250 lb drs, wks . . . . lb.	.14	.15	.14	.15	.14	.17½
Diacetate, 33-35% acid, bbls, lcl, delv . . . . . lb.	...	.09	...	.09	...	.09
Fluoride, white 90%, 300 lb. bbls, wks . . . . . lb.	.07½	.08¼	.07½	.08¼	.07½	.08¼
Hydrosulfite, 200 lb bbls, f.o.b. wks . . . . . lb.	.16	.17	.16	.17	.16	.17
Hyposulfite, tech, pea crys 375 lb bbls, wks 100 lb.	...	2.80	...	2.80	2.50	2.80
Tech, reg cryst, 375 lb bbls, wks . . . . . 100 lb.	2.45	2.80	2.45	2.80	2.40	2.80
Iodide, jars . . . . . lb.	...	2.10	...	2.10	1.90	2.10
Metal, drs, 280 lbs . . . . lb.	...	.19	...	.19	...	.19
Metanilate, 150 lb bbls . . lb.	.41	.42	.41	.42	.41	.42
Metasilicate, gran, c-l, wks . . . . . 100 lb.	...	2.20	...	2 20	2.15	2.20
cryst, drs, c-l, wks 100 lb.	...	2.90	...	2.90	2.75	2.90
Monohydrate, bbls . . . . . lb.	...	.023	...	.023	...	.023
Naphthenate, drs . . . . . lb.	.12	.19	.12	.19	.12	.19
Naphthionate, 300 lb bbl lb.	.52	.54	.52	.54	.52	.54

r Bone dry prices at Chicago 1c higher; Boston ½c; Pacific Coast 2c; Philadelphia deliveries f.o.b. N. Y.; refined 6c higher in each case; s T. N. and Superfine prices quoted f.o.b. N. Y. and Boston; Chicago prices 1c higher; Pacific Coast 3c; Philadelphia f.o.b. N. Y. * Spot price is ⅛c higher. ** Feb. 24; *** Feb. 25.

Current

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Sodium (continued):						
Nitrate, 92%, crude, 200 lb bgs, c-l, NY .... ton	...	28.30	...	28.30	...	28.30
100 lb bgs .... ton	...	29.00	...	29.00	...	29.00
Bulk .... ton	...	27.00	...	27.00	...	27.00
Nitrite, 500 lb bbls lb.	.06¾	.11½	.06¾	.11½	.06¾	.11½
Orthochlorotoluene, sulfonate, 175 lb bbls, wks lb.	.25	.27	.25	.27	.25	.27
Orthosilicate, 300 lb drs, c.l. .... lb.	...	2.90	2.90	2.90	2.90	2.90
Perborate, drs, 400 lbs lb.	.14¾	.15¼	.14¾	.15¼	.14¾	.15¼
Peroxide, bbls, 400 lb lb.	...	.17	...	.17	...	.17
Phosphate, di-sodium, tech, 310 lb bbls, wks 100 lb.	...	2.05	...	2.05	...	2.05
bgs, wks ...... 100 lb.	...	1.85	...	1.85	...	1.85
Tri-sodium, tech, 325 lb bbls, wks ...... 100 lb.	...	2.20	...	2.20	...	2.20
bgs, wks ...... 100 lb.	...	2.00	...	2.00	...	2.00
Picramate, 160 lb kgs lb.	.65	.67	.65	.67	.65	.67
Prussiate, Yellow, 350 lb bbl, wks .... lb.	.09½	.10	.09½	.10	.09	.11½
Pyrophosphate, anhyd, 100 lb bbls f.o.b. wks frt eq lb.	...	.0530	...	.0530	.0530	.10
Sesquisilicate, drs, c-l, wks .... 100 lb.	...	2.80	...	2.80	2.80	3.00
Silicate, 60°, 55 gal drs, wks .... 100 lb.	1.65	1.70	1.65	1.70	1.65	1.70
40°,55 gal drs, wks 100 lb.	...	.80	...	.80	...	.80
tks, wks ..... 100 lb.	...	.65	...	.65	...	.65
Silicofluoride, 450 lb bbls NY .... lb.	.04½	.04¾	.04½	.04¾	.04¾	.06½
Stannate, 100 lb drs ... lb.	.30	.33	.30	.34	.25½	.34
Stearate, bbls .... lb.	.19	.24	.19	.24	.19	.24
Sulfanilate, 400 lb bbls lb.	.16	.18	.16	.18	.16	.18
Sulfate Anhyd, 550 lb bgs* c-l, wks 100 lb. t	1.45	1.90	1.45	1.90	1.45	1.90
Sulfide, 80% cryst, 440 lb bbls, wks .... lb.	...	.02¼	...	.02¼	...	.02¼
Solid, 650 lb drs, c-l, wks .... lb.	...	.03	...	.03	...	.03
Sulfite, cryst, 400 lb bbls, wks .... lb.	.023	.02½	.023	.02½	.023	.02½
Sulfocyanide, drs ..... lb.	.28	.47	.28	.47	.28	.47
Sulforicinoleate, bbls ... lb.	...	.12	...	.12		.12
Tungstate, tech, crys, kgs lb.	1.05	1.10	1.05	1.10	1.05	1.35
Sorbitol, com, solut, wks c-l, drs, wks .... lb.	...	.15½	...	.15½	.15½	.19
Spruce Extract, ord, tks .. lb.	...	.01⅛	...	.01⅛	...	.01⅛
Ordinary, bbls .... lb.	...	.01⅝	...	.01⅝	...	.01⅝
Super spruce ext, tks .. lb.	...	.01⅜	...	.01⅜	...	.01⅜
Super spruce ext, bbls lb.	...	.01⅞	...	.01⅞	...	.01⅞
Super spruce ext, powd, bgs .... lb.	...	.04	...	.04	...	.04
Starch, Pearl, 140 lb bgs 100 lb.	2.50	2.70	2.50	2.80	2.40	3.18
Powd, 140 lb bgs .. 100 lb.	2.60	2.80	2.60	2.90	2.50	3.28
Potato, 200 lb bgs ..... lb.	.04	.05	.04	.05	.03½	.05½
Imp, bgs .... lb.	.05	.06	.05	.06	.05	.06
Rice, 200 lb bbls lb.	.06¼	.07¼	.06¼	.07¼	.06¼	.07¼
Sweet Potato, 240 lb bbls, f.o.b. plant ...... 100 lb.	7.25	7.50	7.25	7.50	...	.
Wheat, thick, bgs lb.	.05	nom.	.05	.05½	.06¼	.07
Strontium carbonate, 600 lb bbls, wks .... lb.	.16½	.17½	.16½	.17½	.16½	.17
Nitrate, 600 lb bbls, NY lb	.07¾	.08¼	.07¾	.08¼	.07¾	.09¼
Sucrose octa-acetate, den, grd, bbls, wks .... lb.	...	.45	...	.45	...	.45
tech, bbls, wks .... lb.	...	.40	...	.40	...	.40
Sulfur, crude, f.o.b. mines ton	..	16.00	...	16.00	16.00	19.00
Flour, coml, bgs ... 100 lb.	1.65	2.35	1.65	2.35	1.65	2.35
bbls .... 100 lb.	1.95	2.70	1.95	2.70	1.95	2.70
Rubbermakers, bgs .. 100 lb.	2.20	2.80	2.20	2.80	2 20	2.80
bbls .... 100 lb.	2.55	3.15	2.55	3.15	2.55	3.15
Extra fine, bgs .... 100 lb.	2.85	3.00	2.85	3 00	2.85	3.00
Superfine, bgs ..... 100 lb.	2.65	2.80	2.65	2.80	2.65	2.80
bbls .... 100 lb.	2.25	3.10	2.25	3.10	2.25	3.10
Flowers, bgs ...... 100 lb.	3.00	3.75	3.00	3.75	3.00	3.75
bbls .... 100 lb.	3.35	4.10	3.35	4.10	3.35	4.10
Roll, bgs .... 100 lb.	2.35	3.10	2.35	3.10	2.35	3.10
bbls .... 100 lb.	2.50	3.25	2.50	3.25	2.50	3.25
Sulfur Chloride, 700 lb drs, wks .... lb.	.03	.04	.03	.04	.03	.04
Sulfur Dioxide, 150 lb cyl lb.	.07	.09	.07	.09	.07	.09
Multiple units, wks ... lb.	.04½	.07	.04½	.07	.04½	.07
tks, wks .... lb.	.04	.05	.04	.05	.04	.05
Refrigeration, cyl, wks lb.	.16	.17	.16	.17	.16	.17
Multiple units, wks ... lb.	.07½	.10	.07½	.10	.07½	.10
Sulfuryl Chloride .... lb.	.15	.40	.15	.40	.15	.40
Sumac, Italian, grd ..... ton		66.00	66.00	67.00	62.00	68 00
Extract, 42°, bbls .... lb.	.05¼	.06¼	.05¼	.06¼	.05¼	.06¼
Superphosphate, 16% bulk, wks .... ton	...	8.00	...	8.00	8.00	9 00
Run of pile .... ton	...	7.50	...	7.50	7.50	8.50
Triple, 40-48%, a.p.a. bulk, wks, Balt. unit ton	.	.70		.70	.70	.85
Talc, Crude, 100 lb bgs, NY ton	13.00	15.00	13.00	15.00	13.00	15.00
Ref'd, 100 lb bgs, NY ton	14.00	16.00	14.00	16.00	14 00	16.00
French, 220 lb bgs, NY ton	23.00	30.00	23.00	30 00	23.00	30.00
Ref'd, white, bgs, NY ton	45.00	60.00	45.00	60 00	45.00	60.00
Italian, 220 lb bgs to arr ton	60.00	62.00	60.00	62.00	60.00	62.00
Ref'd, white, bgs, NY ton	65.00	70 00	65.00	70.00	65.00	70.00
Tankage Grd, NY ... unit u	...	3.25	3.15	3.25	2.50	3.15
Ungrd .... unit u		3.35	3 00	3.35	2.35	3.00
Fert grade, f.o.b. Chgo unit u	...	3.25	3.00	3.50	2.25	3.00
South American cif unit u	...	3.15	3.15	3.35	3.00	3.45
Tapioca Flour, high grade, bgs .... lb.	.01¾	.03¾	.01¾	.05½	.02	.05½
Tar Acid Oil, 15%, drs .. gal.	.21	.24	.21	.24	.21	.25½
25%, drs .... gal.	.25	.28	.25	.28	.25	.29½

t Bags 15c lower; u + 10; * Bbls. are 20c higher.

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Tar, pine, delv, drs .....gal.	...	.26	...	.26	...	.26
tks, delv, E. cities ....gal.	...	.20	...	.20	...	.20
Tartar Emetic, tech, bbls lb.	.27¾	.28	.27¾	.28	.26¾	.28
USP, bbls ....lb.	.33	.33½	.33	.33½	.32	.33½
Terpineol, den grade, drs lb.	...	.17	...	.17		.17
Tetrachlorethane, 650 lb drs lb.	.08	.08½	.08	.08½	.08	.08½
Tetrachloroethylene,drs,tech lb.	...	.09½	...	.09½		.09½
Tetralene, 50 gal drs, wks lb.	.12	.13	.12	.13	.12	.13
Thiocarbanilid, 170 lb bbls lb.	.20	.25	.20	.25	.20	.25
Tin, crystals, 500 lb bbls, wks lb.	.35½	.36	.35½	.36	.31	.36½
Metal, NY ....lb.	...	.4520	.4520	.4665	.3570	.4675
Oxide, 300 lb bbls, wks lb.	.50	52	.50	.52	.44	.50
Tetrachloride, 100 lb drs, wks ....lb.	..	.23	.23	.23½	.18½	.23½
Titanium Dioxide, 300 lb bbls lb.	.14½	.16	.14½	.16	.14½	.17
Barium Pigment, bbls..lb.	.05⅝	.05⅞	.05⅝	.05⅞	.05⅝	.06⅜
Calcium Pigment, bbls lb.	.05⅝	.05⅞	.05⅝	.05⅞	.05⅝	.06⅜
Toluidine, mixed, 900 lb drs, wks ....lb.	.26	.27	.26	.27	.26	.27
Toluol, 110 gal drs, wks..gal.	...	.27	...	.27	.27	.35
8000 gal tks, frt all'd..gal.	...	.22	...	.22	.22	.30
Toner Lithol, red, bbls...lb.	.75	.80	.75	.80	.75	.80
Para, red, bbls ....lb.	.75	.80	.75	.80	.75	.80
Toluidine, bgs ....lb.	...	1.35	...	1.35	...	1.35
Triacetin, 50 gal drs, wks lb.	...	.36	...	.36	...	.36
Triamyl Borate, lcl, drs, wks lb.	...	.27	...	.27	...	.27
Triamylamine, c-l, drs, wks lb.	.77	1.25	.77	1.25	.77	1.25
Tributylamine, lcl, drs, wks lb.	...	.70	...	.70	...	.70
Tributyl citrate, drs, frt all'd lb.	...	.45	...	.45	...	.45
Tributyl Phosphate, frt all'd lb.	...	.42	...	.42	.42	.50
Trichlorethylene, 600 lb drs, frt all'd E. Rocky Mts..lb.	.09	.09½	.09	.09½	.089	.09½
Tricresyl phosphate, tech, drs lb.	.23	.37½	.23	.37½	.23	.39
Triethanolamine, 50 gal drs wks ....lb.	.21	.22	.21	.22	.21	.22
tks, wks ....lb.	...	.20	...	.20	...	.20
Triethylene glycol, drs, wks lb.	...	.26	...	.26	...	.26
Trihydroxyethylamine Oleate, bbls ....lb.	...	.30	...	.30	...	.30
Stearate, bbls ....lb.	...	.30	...	.30	...	.30
Trimethyl Phosphate, drs, lcl f.o.b. dest ....lb.	...	.50	...	.50	...	.50
Trimethylamine, c-l, drs, frt all'd E. Mississippi ....lb.	...	1.00	...	1.00	...	1.00
Triphenylguanidine ......lb.	.58	.60	.58	.60	.58	.60
Triphenyl Phosphate, drs lb.	...	.38	...	.38	.34	.38
Tripoli, airfloated, bgs, wks ton	26.00	30.00	26.00	30.00	26.00	30.00
Turpentine (Spirits), c-l, NY dock, bbls ....gal.	...	.31½*	.29½	.32¾	.26½	.31½
Savannah, bbls ....gal.	...	.26*	.24	.26¾	.20½	.30¾
Jacksonville, bbls ....gal.	...	.26*	.23½	.26¾	.20½	.30¾
Wood Steam dist, bbls, c-l, NY ....gal.	.27	.30	24.2	.30	24.2	.31
Wood, dest dist, c-l, drs, delv E. cities ......gal.	.22	.24	.22	.24	.22	.36
Urea, pure, 112 lb cases lb.	.14½	.15½	.14½	.15½	.14½	.15½
Fert grade, bgs, c.i.f.. ton						
c.i.f. S.A. points ....ton	95.00	110.00	95.00	110.00	95.00	110.00
Dom. f.o.b., wks ......ton	95.00	101.00	95.00	101.00	95.00	101.00
Urea Ammonia liq 55% NH_3, tks ....unit	...	nom.	...	nom.	1.00	1.04
Valonia beard, 42%, tannin bgs ....ton	...	47.00	45.00	47.00	45.00	52.00
Cups, 32% tannin, bgs..ton	...	31.00	30.00	31.00	30.00	37.50
Extract, powd, 63% ...lb.	...	.06	...	.06	...	.06
Vanillin, ex eugenol, 25 lb tins, 2000 lb lots ....lb.	...	2.20	...	2.20	2.10	3.10
Ex-guaiacol ....lb.	...	2.10	...	2.10	2.00	3.00
Ex-lignin ....lb.	.	2.10		2.10	2.00	2.25
Vermilion, English, kgs..lb.	1.56	1.67	1.50	1.67	1.45	1.69
Wattle Bark, bgs ....ton	36.50	38.50	36.00	38.50	36.00	41.75
Extract, 60°, tks, bbls..lb.	...	.04⅜	...	.04⅜	.04⅜	.04⅝
Wax, Bayberry, bgs .....lb.	.18½	.19	.16⅞	.19	.16⅞	.17
Bees, bleached, white 500 lb slabs, cases ......lb.	.37	.39	.37	.39	.35	.45
Yellow, African, bgs..lb.	.18½	.19	.18½	.20	.19	.26
Brazilian, bgs .....lb.	.21	.23	.21	.23	.22	.29
Chilean, bgs ......lb.	.21	.23	.21	.23	.22	.29
Refined, 500 lb slabs, cases lb	.25½	.26	.25½	.33	.32	.39
Candelilla, bgs ....lb.	.15½	.16½	.15¼	.16½	.13½	.16
Carnauba, No. 1, yellow, bgs ....lb.	.37½	.40	.37½	.40	.38	.44
No. 2, yellow, bgs ...lb.	.36½	.38	.36½	.38	.36	.42
No. 2, N. C., bgs ....lb.	.34	.35	.34	.35	.34	.40
No. 3, Chalky, bgs...lb.	.29	.31	.29	.31	.29	.35½
No. 3, N. C., bgs ...lb.	.30	.31½	.30	.31½	.30	.35½
Ceresin, dom, bgs .....lb.	.08½	.11½	.08½	.11½	.08½	.11½
Japan, 224 lb cases ....lb.	.10¾	.11	.09¾	.11	.09¼	.11
Montan, crude, bgs ....lb.	.11	.11¾	.11	.11¾	.11	.12⅛
Paraffin, see Paraffin Wax.						
Spermaceti, blocks, cases lb.	.18	.21	.18	.21	.22	.24
Cakes, cases ....lb.	.19	.22	.19	.22	.23	.25
Whiting, chalk, com 200 lb bgs c-l, wks ....ton	12.00	14.00	12.00	14.00	12.00	14.00
Gilders, bgs, c-l, wks..ton	...	15.00	...	15.00	..	15.00
Wood Flour, c-l, bgs ...ton	20.00	30.00	20.00	30.00	20.00	33.00
Xylol, frt all'd, East 10° tks, wks ....gal.	...	.29	...	.29	.29	.33
Coml, tks, wks, frt all'd, gal.	...	.26	...	.26	.26	.30
Xylidine, mixed crude, drs lb.	.35	.36	.35	.36	.35	.36
Zinc Acetate, tech, bbls, lcl, delv ....lb.	...	.21	...	.21	...	.21
Arsenate, bgs, frt all'd..lb.	.12½	.13	.12½	.13	.12½	.13½
Arsenite, bgs, frt all'd lb.	.12½	.13	.12½	.13	.12½	.13
Carbonate tech, bbls, NY lb.	.14	.15	.14	.15	.14	.15
Chloride fused, 600 lb drs, wks ....lb.	.04¼	.046	.04¼	.046	.04¼	.046
Gran, 500 lb drs, wks lb.	.05	.05¾	.05	.05¾	.05	.05¾
Soln 50%, tks, wks 100 lb.	...	2.25	...	2.25	.	2.25

*** Feb. 24.**

Current

Zinc Cyanide
Oil, Whale

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Zinc (continued):						
Cyanide, 100 lb drs . . . lb.	. . .	.33	. . .	.33	.33	.38
Dust, 500 lb bbls, c-l, delv lb.	. . .	.06½	.06½	.06¾	.06	.0740
Metal, high grade slabs, c-l,						
NY . . . . 100 lb.	. . .	4.90	4.84	4.90	4.35	5.45
E. St. Louis . . . . . 100 lb.	. . .	4.50	. . .	4.50	4.00	5.05
Oxide, Amer, bgs, wks lb.	.06¼	.07½	.06¼	.07½	.06	.07½
French 300 lb bbls, wks lb.	.06½	.07¾	.06½	.07¾	.06¼	.07¾
Palmitate, bbls . . . . lb.	.23	.25	.23	.25	.23	.25
Resinate, fused, pale bbls lb.	. . .	.10	. . .	.10	. . .	.10
Stearate, 50 lb bbls . . . lb.	.20	.23	.20	.23	.20	.23
Zinc Sulfate, crys, 400 lb bbl,						
wks . . . . lb.	. . .	.029	. . .	.029	.029	.033
Flake, bbls . . . . lb.	. .	.0325	. .	.0325	.0325	.0375
Sulfide, 500 lb bbls, delv lb.	.08⅛	.08⅜	.08⅛	.08⅞	.08⅝	.09¾
bgs, delv . . . . lb.	.07⅞	.08⅛	.07⅞	.08⅝	.08⅜	.09
Sulfocarbolate, 100 lb kgs lb.	.24	.26	.24	.26	.24	.26
Zirconium Oxide, crude, 73-75%						
grd, bbls, wks . . . . . . ton	75.00	100.00	75.00	100.00	75.00	100.00
kgs, wks . . . . lb.	.04¼	.04½	.04¼	.04½	.04¼	.04½

Oils and Fats

Babassu, tks, futures . . . lb.	. . .	.06⅛	.06⅛	.06½	.06⅛	.06¾
Castor, No. 3, 400 lb bbls lb.	.09¼	.10	.09¼	.10	.09¼	.10¾
Blown, 400 lb bbls . . lb.	.11¼	.12	.11¼	.12	.11¼	.13
China Wood, drs, spot NY lb.	. . .	.15¼	.15	.15½	.10¼	.15½
Tks, spot NY . . . . lb.	.14¾	.15	.14½	.15	.095	.15½
Coconut, edible, bbls NY lb.	. . .	.08¼	.08⅛	.08¼	.08⅛	.09½
Manila, tks, NY . . . . . . lb.	. . .	.03⅛	. . .	.03⅛	.03⅛	.04¼
Tks, Pacific Coast . . lb.	. . .	.02¾	.02⅝	.02¾	.02⅝	.03¾
Cod, Newfoundland, 50 gal						
bbls . . . . gal.	.30	nom.	.29	.35	.35	.52
Copra, bgs, NY . . . . lb.	. . .	.01725	.0170	.01725	.0170	.0235
Corn, crude, tks, mills . . lb.	.06	.06⅛	.06	.06¼	.06⅜	.08¼
Refd, 375 lb bbls, NY lb.	.08¾	.09	.08¾	.09¾	.09¼	.10½
Degras, American, 50 gal bbls						
NY . . . . lb.	.07	.08	.07	.08	.07½	.08¼
English, bbls, NY . . . . lb.	.07	.08	.07	.08	.07½	.08¼
Greases, Yellow . . . . lb.	.04½	.04⅞	.04½	.05⅛	.03½	.05½
White, choice bbls, NY lb.	.05½	.05¾	.05½	.06	.05	.07
Lard, Oil, edible, prime . lb.	. . .	.09¾	.09¾	.10¼	.10¼	.12¾
Extra, bbls . . . . lb	. . .	.09⅛	.09	.09⅜	.08¾	.10¾
Extra, No. 1, bbls . . . . lb.	. . .	.09	.09	.09¼	.08⅝	.09¾
Linseed, Raw less than 5 bbl						
lots . . . . lb.	.094	.096	.093	.096	.089	.115
bbls, c-l, spot . . . . . . lb.	.086	.088	.085	.088	.081	.102
Tks . . . . lb.	.080	.082	.079	.082	.07½	.096
Menhaden, tks, Baltimore gal	.30½	nom.	.30	.32	.34½	.37½
Refined, alkali, drs . . . lb.	. . .	.072	.072	.077	.067	.095
Tks . . . . lb.	. . .	.066	.066	.071	.061	.087
Kettle bodied, drs . . . lb.	. . .	.082	.082	.088	.076	.105
Light pressed, drs . . . . lb	. . .	.066	.066	.071	.061	.091
Tks . . . . lb.	. . .	.06	.06	.065	.05½	.08
Neatsfoot, CT, 20°, bbls, NY lb.	. . .	.15¼	. . .	.15¼	.15¼	.17¼
Extra, bbls, NY . . . . . . lb.	. . .	.09	.09	.09¼	.08⅝	.10
Pure, bbls, NY . . . . lb.	. . .	.11¾	.10¾	.11¾	.10¾	.12¼
Oiticica, bbls . . . . lb	.09¼	.10¼	.09¼	.11	.09¼	.12¾
Oleo, No. 1, bbls, NY . . lb	. . .	.07¾	.07¾	.08¾	.08½	.10½
No. 2, bbls, NY . . . . . . lb	. . .	.07	.07	.08	.08	.10
Olive, denat, bbls, NY . . gal	.88	.90	.88	.93	.86	1.20
Edible, bbls, NY . . . . gal	1.75	2.00	1.75	2.00	1.75	2.35
Foots, bbls, NY . . . . . . lb.	.07	.07⅛	.07	.07¼	.07	.09⅞
Palm, Kernel, bulk . . . . . lb.	. . .	.0340	. . .	.0340	.0325	.04½
Niger, cks . . . . lb	.03⅝	.03¾	.03⅝	.03¾	. . .	. . .
Sumatra, tks . . . . lb	. . .	.02¾	. . .	.02¾	.02⅝	.0375
Peanut, crude, bbls, NY lb.	. . .	.06⅛	.06⅛	.07	.07	.08¼
Tks, f.o.b. mill . . . . lb	. . .	.06	.06	.06⅝	.06⅝	.08
Refined, bbls, NY . . . . . . lb	.09	.09¼	.09¼	.10	.09¾	.10¾
Perilla, drs, NY . . . . lb	.09½	.09¾	.09½	.09¾	.09¾	.11¾
Tks, Coast . . . . lb	.089	.09	.089	.0925	.09	.11
Pine, see Pine Oil, Chemical Section.						
Rapeseed, blown, bbls, NY lb.	.14	.14½	.14	.14½	.14	.14¾
Denatured, drs, NY . . gal	.80	.82	.80	.82	.75	.91
Red, Distilled, bbls . . . . . . lb.	.07⅜	.08⅛	.07⅜	.08⅛	.07⅜	.10⅝
Tks . . . . lb.	.06½	.07½	.06½	.07½	.06½	.09¾
Sardine, Pac Coast, tks . gal	. . .	.30	.28½	.31½	.28	.46½
Refined alkali, drs . . . . lb	. . .	.072	.072	.077	.067	.095
Tks . . . . lb	. . .	.066	.066	.071	.061	.087
Light pressed, drs . . . . lb	. . .	.066	.066	.071	.061	.089
Tks . . . . lb	. . .	.06	.06	.065	.05½	.08
Sesame, yellow, dom . . . . lb	.09	.09¼	.09	.10½	.10¼	.10½
White, dom . . . . lb	.09	.09¼	.09	.10½	.10¼	.10½
Soy Bean, crude						
Dom, tks, f.o.b. mills lb	. . .	.055	.055	.05¾	.05⅞	.07
Crude, drs, NY . . . . . . lb	.061	.065	.061	.065	.06½	.08
Ref'd, drs, NY . . . . lb.	.073	.077	.073	.077	.07⅝	.097
Tks . . . . lb.	. . .	.067	.067	.0675	.0685	.082
Sperm, 38° CT, bleached bbls						
NY . . . . lb.	.09	.092	.09	.10	.10	.102
45° CT, bleached, bbls,						
NY . . . . lb.	.083	.085	.083	.093	.093	.095
Stearic Acid, double pressed						
dist bgs . . . . lb.	.10½	.11½	.10½	.11½	.10	.12
Double pressed saponified						
bgs . . . . lb	.10¾	.11¾	.10¼	.11¾	.10¼	.12¼
Triple pressed dist bgs lb.	.13½	.14½	.13	.14½	.13	.15
Stearine, Oleo, bbls . . . . lb	.06½	.06¾	.06¼	.06¾	.05½	.08½
Tallow City, extra loose lb	. . .	.05⅛	.05⅛	.05⅜	.04¾	.06⅜
Edible, tierces . . . . lb	.05¾	nom.	.05¾	.06	.06	.07⅝
Acidless, tks, NY . . . . lb		.08	.08	.08¼	.07¾	.09¼
Turkey Red, single, drs . . lb.	.06⅛	.08⅝	.06⅛	.08⅝	.06¼	.08½
Double, bbls . . . . lb	.09⅜	.10⅞	.09⅜	.10⅞	.09½	.13
Whale:						
Winter bleach, bbls, NY lb	.081	.083	.081	.083	.081	.10
Refined, nat, bbls, NY lb	.077	.079	.077	.079	.077	.096

Index to Advertisers

"We"—Editorially Speaking

Sheppard T. Powell, author of the article on "Industrial Water Treatment," in the Creating Industries Series, this issue, received his education at Rensselaer and specialized on water purification, sewage and industrial waste treatment and allied problems. He has since served as consultant on the design and operation of water-purification systems for sanitary

and industrial uses, having been associated with a number of major public utilities and corporations, both in this country and abroad. In recent years he has served as technical expert in a number of important legal cases, and in 1930 was the industrial expert for the State of New Jersey in the injunction suit before the U. S. Supreme Court, involving New Jersey, Pennsylvania and New York, relative to the proposed diversion of the Delaware River by the City of New York. He collaborated in preparation of reports of the Water Planning Committee for the National Resources Board as special consultant on water quality, sewage and industrial waste treatment.

In addition to his consulting work, he was for ten years associate in sanitary engineering at the School of Hygiene (Graduate School), Johns Hopkins University.

For many years Mr. Powell was chairman of the Boiler Feed Water Studies Committee, sponsored by six major engineering organizations. He is the author of the text-book, *Boiler Feed Water Purification*, and has written extensively on problems on water purification, sewage disposal, and industrial waste treatment. In 1934 he was chosen the Edgar Marburg lecturer by the A.S.T.M. He is a member of many technical societies, including the A.I.Ch.E.; American Water Works Association; American Public Health Association; A.S.T.M.; Tappi, etc.

From the deep expression of relief on John Chew's face these days we gather that the suspense of waiting to be a grandpappy is even more devastating than that usually "enjoyed" by a pappy during his first experience with hospital waiting rooms. Instead of looking years older, John appears to be twenty years younger.

The expression "Making hay while the sun shines" is now passé, for Monsanto chemists have developed a phosphate derivative which enables the farmer to put up his hay under variable weather conditions, without fear of spoilage or spontaneous combustion. It won't be long, we suspect, before bills will be offered in Congress authorizing TVA to erect a plant to manufacture the item for free distribution to the farmers.

How can one have a pessimistic outlook on labor relations when one reads that 25 labor union officials were graduated recently by the first school of its kind ever established—a labor relations school conducted by the company employing most of the students.

States R. H. Shainwald, president of the Paraffine Companies, "The principle behind the school is that if employes are to take an active part in determining such fundamentals as wage scales and working conditions, the more informed they are, the sounder the job they will do. A grievance with us now is a rarity."

And by facts and figures company officials show that efficiency has been increased 8% and a 20% elimination of waste has been made.

Fifteen Years Ago

From our issues of March, 1924

Alfred S. Burdick elected president, Abbott Labs., Chicago, Ill.

Dr. E. H. Killheffer, vice-president, Newport Chemical Works, makes plea for support of American dye industry in an address before the Nat'l Ass'n of Hosiery and Underwear Mfrs.

Frank L. McCartny, Monsanto sales manager, resigns to become sales director for Norwich Pharmacal Co. in Middle West.

Mathieson Alkali constructing new plant at Niagara Falls for production ammonia.

Theodore P. Walker and Charles L. Gabriel elected vice-presidents, Commercial Solvents.

American Protective Tariff League opens campaign for tariff on potash to develop the American industry.

Tom M. Girdler, head of Republic Steel, in a talk before the American Institute of Mining and Metallurgical Engineers last month said, "Down in Kentucky, buried in underground vaults, we have stored away a great pile of gold. The time might come during war when we would gladly give all of that gold for a pile of desperately needed manganese or chromium." Fortunately, there are evidences that the government is at last awakened to the necessity of obtaining sizable back-logs of certain vital raw materials.

Did you know—

That the Germany-self-contained program is boasting of the following results—30,000 tons of sulfur recovered by the Alkazid process; 15,000 tons of "sugar solution" from wood waste by the Scholler-Tornesch process; 65% of motor fuel requirements filled by synthetic petrol; over a third of the requirements for textile fibres supplied by rayon and other synthetics.

From *The Atlantic Monthly* to *The Police Gazette* everybody is conducting some sort of an "Information, Please" column, so just to be *a la mode* "We" are going to turn quizzical ourselves and give you a chance to test your own chemical knowledge:

What is the price of C.D. alcohol tomorrow morning?

How do you differentiate between the following terms: (a) trademark; (b) brand; (c) trade-name?

Assuming the amalgamation of five important selling factors (which "We" admit is considerable assumption) into the firm of Chew, Force, Kolb, Litter, and Prior (the order is strictly alphabetical) what would the result be?

What has become of J. Early Wood and the brothers Madero?

If a five per cent. blend of alcohol-gasoline increases motor fuel efficiency ten per cent., how much alcohol would we have to consume to reduce the cost of running an automobile to no cents per mile?

Who does the Patman Law help and why?

Just how will the Board of Trade chemical and drug dinner disinfect the Coster scandal?

Don't go looking on page 315 for the answers, for there are none to any of these questions. But anyone can make up their own, and everyone will be right. Which is our idea of a perfect prize contest.

State of Chemical Trade

Current Statistics (Feb. 28, 1939)—p. 29

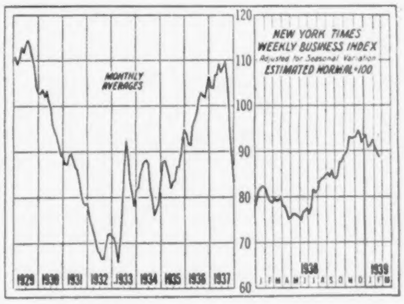
WEEKLY STATISTICS OF BUSINESS

Week Ending	Carloadings 1939	Carloadings 1938	Carloadings % of Change	Electrical Output* 1939	Electrical Output* 1938	Electrical Output* % of Change	Jour. of Com. Price Index	Nat'l Fertilizer Ass'n Price Indices: Chem. & Drugs	Fats & Oils	Fert. Mat.	Mixed Fert.	All Groups	†Labor Dept. Chem. & Drug Price Index	% Steel Activity	N. Y. Times Index Bus. Act.	Fisher Commodity Index
Feb. 4........	576,790	564,740	+2.1	2,287,248	2,082,447	+ 9.8	75.0	92.4	52.1	71.4	78.2	72.8	76.2	53.4	90.4	125.3
Feb. 11........	579,918	542,991	+6.8	2,268,387	2,052,302	+10.5	75.0	92.4	49.6	71.4	78.2	72.7	76.1	54.8	89.4	125.8
Feb. 18........	580,071	535,866	+8.2	2,248,767	2,059,165	+ 9.2	76.0	92.4	51.7	71.1	77.7	72.7	...	53.7	88.9	125.4
Feb. 25........	560,609	511,939	+9.5	2,225,690	2,031,412	+ 9.6	75.7	...	...	...	...	...	...	55.8	...	125.0

* K. W. H. 000 omitted; † Calendar year 1926=100.

MONTHLY STATISTICS

CHEMICAL:	January 1939	January 1938	December 1938	December 1937	November 1938	November 1937
Acid, sulfuric (expressed as 50° Baumé, short tons, Bureau of the Census)						
Total prod. by fert. mfrs.	......	183,794	176.923	199.508	171.106	205.796
Consumpt. in mfr. fert.	......	147.443	148.289	147.443	147.592	166,778
Stocks end of month	......	89.662	90.089	89.662	87.331	91,498
Alcohol, Industrial (Bureau Internal Revenue)						
Ethyl alcohol prod., proof gal..	17,067,489	15,607,206	16,772,479	17,361,670	15,163,681	18.179.322
Comp. denat. prod., wine gal...	474,139	168,465	2.111.297	1,826,805	2,827.108	4,127,663
Removed, wine gal.	443,686	178,157	2,115,316	1,841,075	2,989,361	4,266,405
Stocks end of mo., wine gal. ..	455,280	537,258	426,638	546,648	433,238	564,671
Spec. denat. prod., wine gal. ...	6,354,358	5,714,329	8,388,939	5,185,331	7,367,630	5,480,908
Removed, wine gal.	6,276,800	5,760,616	8,317,195	5,129,560	7,319,801	5,685,569
Stocks end of mo., wine gal...	923,447	554,433	858,630	606,224	799,477	555,036
Ammonia sulfate prod., tons *a*..	45,756	37,734	45,837	43,211	44,985	50,234
Benzol prod., gal. *b*	7,788,000	6,155,000	7,802,000	6,340,000	7,619,000	7,472,000
Byproduct coke, prod., tons *a*..	3,366,956	2,762,474	3,362,845	2,823,800	3,277,523	3,222,300
Cellulose Plastic Products (Bureau of the Census)						
Nitrocellulose sheets, prod., lbs.	......	432,377	543,797	412,887	773,450	824,170
Sheets, ship., lbs.	......	625,686	674,069	514,027	675,716	736,726
Rods, prod., lbs.	......	165,498	187,926	148,889	174,270	185,891
Rods, ship., lbs.	......	201,458	201,074	139,682	266,944	158,721
Tubes, prod., lbs.	......	48,499	57,695	40,701	70,001	56,957
Tubes, ship., lbs.	......	53,851	61,942	46,257	65,573	82,920
Cellulose acetate, sheets, rod, tubes						
Production, lbs.	......	344,539	1,111,639	624,078	1,331,717	782,929
Shipments, lbs.	......	375,945	1,031,652	602,887	1,250,528	678,319
Methanol (Bureau of the Census)						
Production, crude, gals.	......	458,347	357,249	461,539	344,328	423,315
Production, synthetic, gals. ...	......	2,896,894	2,844,249	3,887,741	2,617,979	3,562,372
Pyroxylin-Coated Textiles (Bureau of the Census)						
Light goods, ship., linear yds...	......	1,887,057	2,710,218	1,890,806	2,524,659	2,257,102
Heavy goods, ship., linear yds...	......	1,392,924	1,763,791	1,280,338	1,608,956	1,351,823
Pyroxylin spreads, lbs. *c*......	......	3,602,058	4,647,020	3,365,894	4,263,377	3,762,146
Exports (Bureau of Foreign & Dom. Commerce)						
Chemicals and related prod. *d*..	......	......	......	$10,785	$10,639	$11,521
Crude sulfur *d*	$531	$811	$620	$1,348	$600	$865
Coal-tar chemicals *d*	$1,081	$567	$1,032	$1,114	$815	$991
Industrial chemicals *d*	$1,769	$2,071	$2,065	$1,933	$2,093	$2,226
Imports						
Chemicals and related prod. *d*..	......	......	......	$8,261	$6,930	$7,804
Coal-tar chemicals *d*	$1,817	$1,377	$1,188	$1,482	$1,917	$1,220
Industrial chemicals *d*	$1,119	$1,261	$1,295	$1,551	$1,295	$2,033
Payrolls (U. S. Dept. of Labor, 3 year av., 1923-25 = 100)						
Chemicals and allied prod., including petroleum	......	117.4	120.1	122.4	119.1	129.9
Other than petroleum	......	112.2	115.9	117.2	114.6	126.3
Chemicals	......	124.8	130.2	131.4	128.1	142.8
Explosives	......	82.3	95.1	97.6	91.7	103.8
Employment (U. S. Dept. of Labor, 3 year av., 1923-25 = 100)						
Chemicals and allied prod., including petroleum	......	112.5	112.6	118.3	113.0	124.5
Other than petroleum	......	111.0	111.3	117.0	111.6	123.7
Chemicals	......	118.3	116.9	124.8	117.2	132.1
Explosives	......	90.2	82.7	89.3	82.8	90.1
Price index chemicals	......	......	80.0	83.5	80.2	84.2
Chem. and drugs	......	......	76.7	79.5	76.6	80.2
Fert. mat.	......	......	68.6	72.0	67.7	71.9
FERTILIZER:						
Exports (short tons, Nat. Fert. Association)						
Fertilizer and fert. materials...	......	121,745	133,295	135,173	147,587	152,388
Ammonium sulfate	......	4,706	2,482	3,192	4,494	13,485
Total phosphate rock	......	78,785	91,350	101,965	107,760	85,597
Total potash fertilizers	......	886	3,945	4,040	3,080	13,730
Imports (short tons, Nat. Fert. Association)						
Fertilizer and fert. materials ..	......	189,174	146,937	195,513	114,164	150,657
Ammonium sulfate	......	7,105	12,547	5,731	9,677	11,910
Sodium nitrate	......	84,122	32,336	55,932	4,851	21,398
Total potash fertilizer	......	48,083	66,897	93,328	58,730	69,842



Business: While the general rate of activity expanded seasonally in the past 30 days, the extent of the improvement was not quite up to earlier expectations. Some degree of hesitancy developed, the causes of which were not very clear.

Steel: Rate of activity failed to reach the 60% mark in the past month. The strength of steel scrap prices seems to point to an early resumption of the upward trend, according to *Iron Age.* Steel buyers still appear to be wedded to caution in making commitments, but the number of orders is increasing, indicating a definite broadening of activity. Steel producers expect that the automobile companies will enter the market in a large way during March. The railroads are still taking fair-sized quantities.

Automotive: February production is estimated at approximately 275,000 units. Output was curtailed slightly by local labor disputes in certain of the Detroit plants. Currently, production is about 30% ahead of the rate prevailing at this period a year ago. The industry is all set for a sharp advance and production schedules are expected to expand by mid-March.

Retail Trade: Total retail volume was said to be from 1% to 4% ahead of the corresponding period in '38. Spotty weather conditions resulted in gains and losses in various sections of the country. Dollar retail sales volume in March should show the usual seasonal improvement over February this year. An earlier Easter is expected to stimulate trade.

Wholesale Trade: The current volume is somewhat ahead of that of last year, but retail buyers are still showing very little interest in forward purchas-

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ing on a large scale. Orders are coming in more frequently, but the volume is disappointing.

Employment: The seasonal rise continues, but the gains are not exactly encouraging in view of the still large numbers of unemployed.

Textiles: Sentiment shifts back and forth depending upon unexpected spurts and declines in buying activity. Gray goods supplies have been piling up and there is some talk of shut-downs in the mill sections. February silk consumption was below earlier estimates. Rayon production is slowly gaining greater momentum. Orders now on the books insure a high level of operation during the second quarter.

Glass: According to *The American Glass Review* "Prospects are extremely bright for increased shipments and heavier production in all branches in the next 30 days." January window glass production was at a rate of 58.1% of capacity, as compared with 43.5% in January of '38. Output of plate glass in January was more than double the like month in '38.

Rubber: January rubber consumption totaled 46,234 tons, as against 29,429 tons in January of '38. March tire output is expected to show a sharp increase.

Commodity Prices: Movement continues in narrow limits for most of the important commodities. The general trend is down and several items have dipped under last year's low levels.

Paper: Canadian newsprint shipments in January were up 19.5% from the corresponding month of '38 and the monthly total exceeds that of the previous year for the first time since November, '37.

Chemicals: Despite some slowing down in industrial activity (when comparison is made with what is seasonally normal) chemical consumption in the first quarter is still expected to show about a 15% gain over the corresponding period of '38.

Outlook: One school of thought holds that the January setback is a normal recession following the sharp advance which set in last July. Among this group there is definite optimism and the opinion is freely expressed that the end of March will witness a new peak for the recovery movement. Certainly general conditions are better than they have been. A more conciliatory tone on the part of the administration is in evidence; the foreign situation has improved with the virtual ending of the Spanish Civil War, inventories are lower than they were at this time a year ago.

MONTHLY STATISTICS (cont'd)

FERTILIZER: (Cont'd)	January 1939	January 1938	December 1938	December 1937	November 1938	November 1937
Superphosphate e (Nat. Fert. Association)						
Production, bulk	......	299,484	280,293	357,479	287,123	324,514
Shipments, total	......	188,525	163,992	190,089	133,803	179,112
Northern area	......	68,747	65,432	88,274	66,239	96,182
Southern area	......	119,778	98,560	101,815	67,564	82,930
Stocks, end of month, total	......	2,013,189	1,768,103	1,845,001	1,595,469	1,607,475
Tag Sales (short tons, Nat. Fert. Association)						
Total, 17 states	450,581	459,340	219,046	186,941	146,872	123,466
Total, 12 southern	438,105	437,504	217,180	184,948	146,145	122,889
Total, 5 midwest	12,476	21,836	1,866	1,993	727	577
Fertilizer payrolls	......	78.5	7,018	81.2	65.2	76.5
Fertilizer employment	......	82.6	82.6	90.6	78.5	83.6
Value imports, fert. and mat. *d*	$3,247	$3,736	......	$4,318	$2,805	$3,633
GENERAL:						
Acceptances outst'd'g *f*	$255	$325	$269	$343	$273	$348
Coal prod., anthracite, tons	4,046,821	4,421,519	3,848,666	4,159,738	3,167,348	3,694,322
Coal prod., bituminous, tons	35,530,000	30,950,000	36,230,000	36,226,000	35,480,000	36,428,000
Com. paper outst'd'g *f*	$195	$299	$186	$279	$206	$311
Failures, Dun & Bradstreet	1,263	1,377	875	1,009	984	842
Factory payrolls *i*	......	71.6	86.6	84.2	84.1	84.1
Factory employment *i*	......	82.2	91.1	94.5	90.5	101.1
Merchandise imports *i*	$178,201	$170,689	$171,379	$208,833	$176,181	$223,090
Merchandise exports *i*	$212,908	$289,063	$268,829	$323,403	$252,231	$314,697
GENERAL MANUFACTURING:						
Automotive production	339,152	209,528	388,346	326,234	372,359	360,055
Boot and shoe prod., pairs	......	25,523,389	29,987,849	21,047,582	29,742,503	21,289,938
Bldg. contracts, Dodge *j*	$251,673	$192,231	$389,439	$209,451	$301,679	$198,464
Newsprint prod., U. S. tons	77,264	82,014	75,855	79,537	78,390	79,338
Newsprint prod., Canada, tons.	208,382	194,264	209,753	293,038	245,295	302,236
Glass Containers, gross	......	......	3,514,537	......	3,709,379	3,491,251
Plate glass prod., sq. ft.	12,209,080	5,119,182	12,691,262	8,920,809	12,883,448	12,517,311
Window glass prod., boxes	943,184	705,721	1,003,150	953,964	882,595	1,095,267
Steel ingot prod., tons	3,186,834	1,732,764	3,143,169	1,473,021	3,572,220	2,154,365
% steel capacity	52.69	29.15	53.0	25.37	62.5	38.23
Pig iron prod., tons	2,175,423	1,429,085	2,201,627	1,490,324	2,269,983	2,006,724
U. S. consumpt. crude rub., tons	46,234	29,429	45,315	29,195	46,169	34,025
Tire shipments	......	......	4,170,808	3,043,970	4,442,296	3,776,775
Tire production	......	......	4,678,878	2,851,940	4,117,457	3,119,585
Tire inventories	......	......	8,497,932	10,383,235	7,924,114	10,963,469
Cotton consumpt., bales	591,991	433,258	565,307	432,328	596,289	482,976
Cotton spindles oper.	22,440,278	22,325,472	22,444,784	22,337,254	22,449,280	22,778,818
Silk deliveries, bales	40,816	30,715	35,204	21,982	41,599	31,749
Wool Consumption *z*	......	......	29.0	15.0	34.1	14.0
Rayon deliv., lbs.	27,100,000	......	26,200,000	......	21,000,000	9,400,000
Hosiery (all kinds) *t*	......	......	10,640,630	9,090,271	9,035,186	7,069,349
Rayon employment *i*	......	315.2	311.2	314.5	312.8	349.2
Rayon payrolls *i*	......	275.5	302.2	294.0	302.7	337.9
Soap employment *i*	......	94.0	88.6	87.6	88.9	92.6
Soap payrolls *i*	......	109.2	89.5	89.1	88.3	93.4
Paper and pulp employment *i*.	......	108.2	106.2	106.8	105.9	110.9
Paper and pulp payrolls *i*	......	98.0	103.8	97.3	103.0	103.8
Leather employment	......	76.6	85.3	76.9	84.0	81.1
Leather payrolls *i*	......	76.9	87.8	71.4	84.7	75.2
Glass employment *i*	......	87.6	92.6	99.8	92.1	106.5
Glass payrolls *i*	......	76.2	98.9	96.5	98.6	112.7
Rubber prod. employment *i*	......	78.3	83.5	85.6	82.4	90.5
Rubber prod. payrolls *i*	......	65.9	89.1	77.3	85.2	82.2
Dyeing and fin. employment *i*.	......	103.6	112.4	105.5	109.3	108.9
Dyeing and fin. payrolls *i*	......	83.9	97.3	86.6	92.7	89.1
MISCELLANEOUS:						
Oils & Fats Index ('26 = 100)	......	70.7	57.5	85.6	57.9	67.1
Gasoline prod., bbls.	......	42,859	48,026	47,629	48,201	47,877
Cottonseed oil consumpt., bbls.	229,666	378,092	209,706	358,328	263,024	427,605
PAINT, VARNISH, LACQUER, FILLERS:						
Sales 680 establishments	......	$22,115,195	$21,281,326	$19,348,567	$26,253,314	$26,105,315
Trade sales (580 establishments)	......	$11,448,115	$9,885,307	$9,088,658	$13,183,545	$12,790,654
Industrial sales, total	......	$8,282,661	$9,293,043	$8,293,742	$10,638,281	$10,889,719
Paint & Varnish, employ. *i*	......	......	112.4	117.2	112.4	123.8
Paint & Varnish, payrolls *i*	......	......	115.4	113.5	113.8	122.1
Paint & Varnish, exports *d*	$602	$666	$790	$862	......	......

a Bureau of Mines; *b* Crude and refined plus motor benzol, Bureau of Mines; *c* Based on 1 lb. of gun cotton to 7 lbs. of solvent, making an 8-lb. jelly; *d* 000 omitted, Bureau of Foreign & Domestic Commerce; *e* Expressed in equivalent tons of 16% A.P.A.; *f* 000,000 omitted at end of month; *i* U. S. Dept. of Labor, 3 year average, 1923-25 = 100; *j* 000 omitted, 37 states; *p* Rayon Organon, formerly an index was given, now the exact poundage is given; *q* 680 establishments, Bureau of the Census; *r* Classified sales, 580 establishments, Bureau of the Census; *s* 53 manufacturers, Bureau of the Census; *t* 381 identical manufacturers, Bureau of the Census, quantity expressed in dozen pairs; *v* In thousands of bbls., Bureau of the Census; ** Indices, Survey of Current Business, U. S. Dept. of Commerce; *z* Units are millions of lbs.

Chemical Finances

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Volume of stocks traded on the N. Y. Stock Exchange totaled 13,873,323 shares in February, compared with 25,182,350 in January, a decline of 11,309,027 shares. Bond trading amounted to $118,993,000 par value, lowest volume since Feb., '18.

Price Trend of Representative Chemical Company Stocks

	Jan. 31	Feb. 4	Feb. 11	Feb. 18	Feb. 25	Feb. 28	Net gain or loss last mo.	Price on Feb. 28, 1938	1939 High	1939 Low
Air Reduction	57⅝	58¾	58¼	59¼	58⅞	58⅞	+1¼	52⅝	65⅝	54¼
Allied Chemical	173½	171½	172¼	173	174½	174¼	+ ¾	168	193	170½
Amer. Cyanamid "B"	24⅛	24	23⅜	24½	25⅝	25¼	+1⅛	25⅞	28⅜	22⅜
Amer. Agric. Chem.	20½n	20n	20	19¼n	20n	19½n	—1	62	24¼	19⅛
Columbian Carbon	83⅞*	85	85	85	85	87	+3⅛	70	93	81
Commercial Solvents	11⅝	11½	12⅛	13¼	13½	13	+1⅜	8½	13¾	10⅜
Dow Chemical	118	116	119	115	118½	117½†	— ½	105¼	135	114¼
du Pont	146¾	148¾	148⅜	150	149⅞	149	+2¼	118½	156¾	142
Hercules Powder	77	77	77	77	77	76⅞	— ⅛	56	86	71
Mathieson Alkali	31½	31½	30½	31¾	29½	29½	—2	25¼	36	27½
Monsanto Chemical	101¾	102½	100	110¼	99½	99¾	—2	88¾	111	96
Std. of N. J.	50¼	50⅛	48¾	49	48½	48½	—1¾	53	53¼	47¼
Texas Gulf Sulphur	30¾	31½	31	30½	30⅞	29⅞	— ⅞	32¼	32⅝	29½
Union Carbide	85⅞	84¾	82½	83½	85	84⅜	—1½	78	90½	81⅛
U. S. Ind. Alcohol	21½	22	22	21¾	22	22⅜	+ ⅞	19⅝	24⅞	18½

* Jan. 28; †Feb. 27.

Earnings Statements Summarized

Company:	Annual dividends	Net income 1938	Net income 1937	Common share earnings 1938	Common share earnings 1937	Surplus after dividends 1938	Surplus after dividends 1937
Abbott Laboratories:							
n Year, Dec. 31	§$1.60	$1,648,326	$1,612,360	$2.43	$2.51	......	......
Archer-Daniels-Midland:							
**Dec. 31 quarter	y1.00	230,190	317,667	.33	.49	......	......
Six months, Dec. 31	y1.00	425,108	676,117	.59	1.04	......	......
Atlas Powder:							
Year, Dec. 31	y2.25	1,013,056	1,433,871	2.69	4.40	......	......
Celluloid Corp.:							
Year, Dec. 31	f ...	†194,131	160,464	...	r6.72	......	......
Chickasha Cotton Oil:							
Six months, Dec. 31	f ...	35,476	200,000	.14	.78	......	......
Commercial Solvents:							
Year, Dec. 31	f ...	†294,358	1,586,917	...	.60	......	......
du Pont:							
Year, Dec. 31	k3.25	50,190,827	88,031,943	3.79	7.29	$5,479,025	$11,285,882
Flintkote Co.:							
Year, Dec. 31	y .60	811,818	1,005,423	1.21	1.50	......	......
Formica Insulation Co.:							
Year, Dec. 31	y .20	53,520	240,966	.30	1.34	......	......
General Paint Corp.:							
Year, Nov. 30	e .25	275,889	530,291	.36	1.87	......	......
General Printing Ink Corp.:							
n Year, Dec. 31	y .50	663,667	1,180,768	.62	1.32	......	......
Grand Rapids Varnish:							
Year, Dec. 31	y .35	9,987	161,796	.07	1.22	......	......
Industrial Rayon Corp.:							
Year, Dec. 31	f...	184,410	262,210	.24	.34	......	......
Liquid Carbonic Corp.:							
Dec. 31, quarter	y1.05	†297,283	†14,538	....	...	......	......
Molybdenum Corp. of America:							
Year, Dec. 31	f....	232,469	574,955	.40	.99	......	......
Monsanto Chemical Co.:							
Year, Dec. 31	2.00	t2,914,843	t4,898,309	h2.35	h4.40	......	......
National Lead Co.:							
Year, Dec. 31	y .50	4,283,140	4,886,951	.75	.94	774,267	1,378,078
National Oil Products:							
Year, Dec. 31	y .90	401,871	438,249	j2.28	h2.53	......	......
New Jersey Zinc Co.:							
Dec. 31, quarter	k2.00	1,035,210	1,347,986	.53	.68	......	......
Year, Dec. 31	k2.00	3,220,314	7,871,914	1.64	4.01	d706,214	18,858
Norwich Pharmacal Co.:							
Year, Dec. 31	w .25	713,728	807,151	....	....	......	......
Parke, Davis & Co.:							
Year, Dec. 31	y1.60	8,639,955	9,068,304	1.76	1.85	810,772	751,480
St. Joseph Lead Co.:							
Year, Dec. 31	y1.00	1,331,256	7,127,945	.68	3.64	d624,424	2,238,747
Sharp & Dohme, Inc.:							
Year, Dec. 31	f....	668,167	999,168	p2.91	.25	d133,630	197,372
Shell Union Oil:							
Year, Dec. 31	y .70	v11,000,000	20,668,880	.70	1.44	......	......
Sterling Products, Inc.:							
Year, Dec. 31	3.80	8,741,363	9,016,243	h5.10	h5.28	2,254,684	1,840,598
Sun Oil Co.:							
n Year, Dec. 31	y1.00	3,085,119	9,544,085	1.07	4.17	169,334	6,799,749
Tubize Chatillon:							
Year, Dec. 31	f....	281,934	1,439,939	a .78	1.04	......	......
United Carbon Co.:							
Year, Dec. 31	y3.25	1,505,874	2,350,486	3.78	5.90	......	......
U. S. Gypsum Co.:							
Year, Dec. 31	2.00	4,725,497	5,421,010	3.50	4.08	......	......
Valspar Corp.:							
Year, Nov. 30	f....	72,894	269,328	p2.39	.38	......	......
Young, J. S., Co.:							
Year, Dec. 31	k6.00	142,651	157,266	6.51	7.50	......	......

n Preliminary statement; § Plus extras; ** Indicated quarterly earnings as shown by a comparison of company reports for first quarter of fiscal year and the 6 months' period; y Amount paid or payable in 12 months to and including the payable date of the most recent dividend announcement; f No common dividend; † Net loss; r On first preferred stock; k Paid in year 1938; e Paid in last 12 months, dividend deferred, omitted or no action taken at latest meeting; t Surplus available for common stock after preferred dividends; h On shares outstanding at close of respective periods; j On average shares; d Deficit; w Last dividend declared; period not announced by company; p On preferred stock; a On Class A shares.

Dividends and Dates

Name	*Div.*	*Stock Record*	*Payable*
Abbott Labs., E	10c	Mar. 14	Mar. 31
Abbott Labs., Q	40c	Mar. 14	Mar. 31
Abbott Labs., pf., Q	$1.12½	Apr. 1	Apr. 15
Amer. Maize Prods.	25c	Mar. 24	Mar. 31
Amer. Maize Prods. pf., Q	$1.75	Mar. 24	Mar. 31
Amer. Smelt. & Ret.	50c	Feb. 3	Feb. 28
Archer-Daniels-Midland	25c	Feb. 18	Mar. 1
Atlantic Ref. Co., Q	25c	Feb. 21	Mar. 15
Atlas Powder	50c	Feb. 28	Mar. 10
Basic Dolomite	12½c	Mar. 1	Mar. 15
Canadian Industries, Cl. A	$1.50	Mar. 31	Apr. 29
Canadian Industries, Cl. B	$1.50	Mar. 31	Apr. 29
Canadian Industries, pf., Q	$1.75	Mar. 31	Apr. 15
Colgate-Palmolive-Peet, pf., Q	$1.50	Mar. 6	Apr. 1
Comm'l Alcohols, Ltd., pf., Q	10c	Apr. 1	Apr. 15
Columbian Carbon, Q	$1.00	Feb. 17	Mar. 10
Cook Paint & Varnish, Q	15c	Feb. 17	Mar. 1
Cook Paint & Varnish, pf., Q	$1.00	Feb. 17	Mar. 1
Courtaulds, Ltd., F	2½%	Feb. 21	Mar. 25
Devoe & Raynolds, A & B	Passed Dec. 7, 1938.		
Devoe & Raynolds, pf., Q	$1.75	Mar. 20	Apr. 1
du Pont, deb., Q	$1.50	Apr. 10	Apr. 25
du Pont, pf., Q	$1.12½	Apr. 10	Apr. 25
du Pont, I	$1.25	Feb. 27	Mar. 14
Freeport Sulphur, Q	25c	Feb. 14	Mar. 1
General Print. Ink.	10c	Mar. 14	Apr. 1
General Print. Ink. pf., Q	$1.50	Mar. 14	Apr. 1
Glidden, conv., pf., Q	56¼c	Mar. 17	Apr. 1
Hercules Powder	40c	Mar. 13	Mar. 24
Heyden Chemical Corp.	40c	Feb. 20	Mar. 1
Int'l Nickel	50c	Mar. 1	Mar. 31
Liquid Carbonic	20c	Mar. 16	Apr. 1
Mathieson Alkali, Q	37½c	Mar. 3	Mar. 31
Mathieson Alkali, pf., Q	$1.75	Mar. 3	Mar. 31
Monroe Chemical, pf., Q	87½c	Mar. 11	Apr. 1
Monsanto Chemical, pf., S	$2.25	May 10	June 1
Monsanto Chemical, pf., B, In.	$2.09	May 10	June 1
Monsanto Chemical, Q	50c	Mar. 1	Mar. 15
Nat. Gypsum, new pf., In.	$1.12½	Feb. 16	Mar. 1
Nat. Lead, pf., A, Q	$1.75	Mar. 3	Mar. 15
N. J. Zinc Co.	50c	Feb. 18	Mar. 10
Parker-Rust-Proof, Q	25c	Feb. 10	Mar. 1
Patterson-Sargent	12½c	Feb. 16	Mar. 1
Penick & Ford, Ltd., Q	75c	Mar. 3	Mar. 15
Procter & Gamble, 5% pf., Q	$1.25	Feb. 24	Mar. 15
Sherwin-Williams Co., pf., Q	$1.25	Feb. 15	Mar. 1
Sherwin-Williams of Can., pf., Ac.	$1.75	Mar. 15	Apr. 1
Spencer Kellogg & Sons	20c	Feb. 21	Mar. 10
Staley Mfg. Co., A. E., pf., Q	$1.25	Mar. 10	Mar. 20
Texas Gulf Sulphur, Q	50c	Mar. 1	Mar. 15
United Dyewood, pf., Q	$1.75	Mar. 10	Apr. 1
Westvaco Chlorine, pr., Cp., Q	25c	Feb. 10	Mar. 1

E Extra; F Final distribution for year; I Interim; S Semi-annual; Ac Accumulations.

Union Carbide directors on Feb. 28 declared a dividend of 50c, payable April 1 to stock of record March 10. On Jan. 2, this year, a dividend of 40c was distributed.

Chemical Finances
February 1939—p. 30

Chemical Stocks and Bonds

Feb. 1939 Last	Feb. 1939 High	Feb. 1939 Low	1938 High	1938 Low	1937 High	1937 Low	Sales: Number of shares February 1939	Sales: Number of shares 1939	Stocks	Par $	Shares Listed	Dividends*	Earnings** $-per-share-$ 1938	1937	1936
NEW YORK STOCK EXCHANGE															
58½	58½	55	61	46¼	55	46	3,300	5,500	Abbott Labs.	No	640,000	$1.70	2.43	2.51	2.21
58⅞	65⅝	54¼	67⅞	40	80¼	44½	10,400	32,500	Air Reduction	No	2,566,191	1.50	....	2.86	2.79
174¼	193	170½	197	124	258½	145	6,000	13,000	Allied Chem & Dye	No	2,214,099	6.00	....	11.19	11.44
19½	24¼	19⅛	28½	22	33¾	17⅞	4,700	8,200	Amer. Agric. Chem	No	627,987	1.43	....	2.95	1.57
9⅛	11⅛	8¾	15	9	30¾	8¼	3,800	10,800	Amer. Com. Alcohol	No	260,930	....	....	3.23	4.55
26⅝	29½	25½	31½	20	46	22	500	1,500	Archer-Dan.-Midland	No	549,546	1.25	....	5.03	3.05
64	66¾	57	68	36	94	38	1,100	2,900	Atlas Powder Co.	No	249,163	2.25	2.69	4.40	4.21
126½	127	122	126¼	105	133	101	520	830	5% conv. cum. pfd.	100	68,597	5.00	14.77	20.90	20.85
23⅛	24⅜	17⅝	26⅝	9	41¼	13	25,200	69,900	Celanese Corp. Amer.	No	1,000,000	....	....	2.04	2.33
92⅛	94	89	96	82	115	90	500	800	prior pfd.	100	164,818	7.00	....	27.07	27.25
15½	15⅞	11⅝	17	7⅛	25¾	8½	51,800	72,900	Colgate-Palm.-Peet	No	1,999,970	.25	....	—.35	1.40
104	104	101⅞	104¼	78	104½	95	3,700	5,000	6% pfd.	100	248,197	6.00	....	3.21	17.13
87	93	81	98½	53¾	125¾	65	1,200	5,200	Columbian Carbon	No	537,406	4.00	....	8.31	7.48
13	13¾	10⅜	12¼	5⅞	21¼	5	176,600	386,100	Commercial Solvents	No	2,636,878	....	....	.60	.85
66	66¾	61¼	70¾	53	71¼	50½	10,700	23,500	Corn Products	25	2,530,000	3.00	....	2.52	3.86
173	176¾	173	177	162	171½	153	700	1,600	7% cum. pfd.	100	245,738	7.00	...	32.96	46.76
30	32⅜	27	40⅞	25	76⅛	29½	1,230	4,100	Devoe & Rayn. A.	No	95,000	2.00	—1.72	4.05	4.49
118½	135	114¼	141	87⅞	159¼	79½	3,600	10,500	Dow Chemical	No	945,000	3.00	.	4.17	4.48
149	156¾	142	154¾	90½	180⅛	98	20,000	56,900	DuPont de Nemours	20	11,065,762	3.25	3.74	7.37	7.54
119¼	121	117½	120½	109½	112	107½	1,200	2,800	4½% pfd.	No	500,000	4.50	87.27	165.48	.....
140¼	140¼	136¾	138½	130¾	135½	130	2,900	5,600	6% cum. deb.	100	1,092,948	6.00	45.92	81.70	84.21
171¾	186⅛	170	187	121½	198	144	6,400	15,600	Eastman Kodak	No	2,250,921	6.50	....	9.76	8.23
180	183½	175½	173	157	164	150	210	310	6% cum.	100	61,657	6.00	...	362.45	306,64
23½	30	23¼	32	19⅞	32¼	18	8,000	27,600	Freeport Texas	10	796,380	2.00	1.87	3.30	2.43
9⅜	10⅞	8⅝	12⅛	6¾	19	8½	3,500	9,500	Gen. Printing Ink	1	735,960	.50	.62	1.32	1.32
21½	24½	19	28½	13	51½	19⅛	900	24,300	Glidden Co.	No	799,701	.50	....	2.62	3.29
45½	45½	45	51½	37	58⅛	43	300	1,200	4½% cum. pfd.	50	199,940	2.25	....	12.72	15.43
102¾	106	102¼	111	76¾	117½	80⅛	9,000	2,600	Hazel Atlas	25	434,474	5.00	..	6.67	6.55
76⅞	86	71	87	42¾	92½	50	6,300	15,200	Hercules Powder	No	1,316,710	1.50	1.95	2.97	3.24
135	135¼	133	135¼	126¾	135½	125	660	780	6% cum. pfd.	100	96,194	6.00	35.31	50.75	48.97
27⅛	29½	24	30⅜	14⅜	47½	15	11,200	39,900	Industrial Rayon	No	759,325	.25	.24	.34	2.24
27	28½	23	34½	15	64¼	20	3,500	12,100	Interchem.	No	289,058	....	....	1.44	3.02
92⅝	93	91½	98	80	111½	92	500	1,330	6% pfd.	100	66,917	6.00	....	12.26	18.97
2⅜	3⅛	2¼	3⅞	2	9⅛	2	2,800	9,900	Intern. Agricul.	No	438,048	....	....	.16	—1.55
24	27⅝	22¾	29	15	63½	18¼	1,000	4,000	7% cum. pfd.	100	100,000	2.00	....	7.70	.23
52⅞	55¾	46	57⅝	36⅞	73⅜	37	80,300	215,400	Intern. Nickel	No	14,584,025	2.00	....	3.31	2.40
32⅛	34	29	30¼	19½	28¾	19½	800	2,200	Intern. Salt	No	240,000	2.00	....	2.17	1.70
20½	21½	19	24	19⅛	36	19¼	400	1,200	Kellogg (Spencer)	No	500,000	1.40	....	2.81	2.62
50⅞	54	43	58⅜	23¼	79	33⅝	12,200	33,900	Libbey Owens Ford	No	2,506,117	1.25	....	4.19	4.14
17½	19	16	21½	12⅛	26⅞	14	3,600	12,200	Liquid Carbonic	No	700,000	1.25	...	2.37	1.58
29½	36	27½	36⅞	19¾	41¾	22	3,100	8,400	Mathieson Alkali	No	828,171	1.50	1.01	1.81	1.76
99¾	111	96	110	67	107½	71	8,100	19,500	Monsanto Chem.	No	1,241,816	2.00	2.35	4.40	4.01
118¼	119¼	115½	117½	111	109	105	360	950	4½% pfds. (A & B)	No	100,000	4.50	..	49.99	.....
24	27½	22	31	17⅛	44	18	26,000	58,100	National Lead	10	3,095,100	.50	.75	.95	1.71
169⅞	169⅞	165	178½	154	171	153	200	800	7% cum, "A" pfd.	100	213,793	7.00	26.03	22.86	33.83
141½	145	137¾	145½	127	150	127	480	1,530	6% cum. "B" pfd.	100	103,277	6.00	35.97	43.77	74.50
14¾	17⅛	12⅞	19½	9⅞	41¾	10⅛	16,200	46,400	Newport Industries	1	519,347	....	....	2.22	.99
64½	70	60	76¼	40	103¾	51¼	11,800	29,500	Owens-Illinois Glass	12.50	2,661,204	1.50	2.02	3.51	3.80
56¼	57	53⅝	59	39½	65½	43¼	12,200	26,700	Procter & Gamble	No	6,325,087	2.00	....	4.08	2.39
119½	119¾	116	122¼	114	118½	114½	1,100	2,250	5% pfd.	100	169,517	5.00	....	157.05	94.14
13⅞	15⅛	11¾	18⅜	10	34¾	14⅞	10,100	30,400	Shell Union Oil	No	13,070,625	.70	.70	1.44	1.35
106	107	104½	106½	93	105⅜	91	800	3,100	5½% cum. pfd.	100	379,798	5.50	....	60.59	57.20
25¼	29½	21	34¾	18½	60⅝	26½	7,700	24,200	Skelly Oil	No	1,006,348	1.00	....	6.07	4.42
95	95½	94⅞	98	84	102¼	88	....	500	6% cum. pfd.	100	66,300	6.00	....	97.86	73.16
26⅞	29⅛	26⅛	35½	24¾	50	26½	35,700	96,800	S. O. Indiana	25	15,235,323	1.00	....	3.06	3.09
48½	53¼	47¼	58⅜	39¾	76	42	46,300	125,500	S. O. New Jersey	25	26,224,767	1.50	....	5.64	3.73
5⅞	6½	5⅛	8	3⅞	15⅜	5¼	3,300	15,000	Tenn. Corp.	5	853,696	....	..	1.09	.41
43	48¼	42½	49⅝	37⅝	65⅛	34¾	52,700	128,300	Texas Corp.	25	11,386,253	2.00	2.15	5.02	4.10
29⅞	32⅝	29½	38	26	44	23¾	18,100	47,900	Texas Gulf Sulphur	No	3,840,000	2.00	....	3.02	2.57
84⅜	90½	81⅛	90⅞	57	111	61¼	32,200	74,300	Union Carbide & Carbon	No	9,000,743	2.40	...	4.75	4.09
58¼	65	54	73½	39	91	36¾	2,800	8,600	United Carbon	No	397,885	3.25	3.78	5.30	5.54
22⅜	24⅞	18½	30¼	13½	43⅝	16⅛	5,700	12,300	U. S. Indus. Alcohol	No	391,238	....	....	1.24	—.20
26⅞	30¼	22	28⅞	11½	39⅜	9¼	18,500	64,800	Vanadium Corp. Amer.	No	376,637	....	....	2.22	.40
25½	25⅞	21¾	25¼	13½	...	...	10,100	19,600	Victor Chem.	5	696,000	.90	....	1.01	1.16
3⅞	4⅞	3½	5⅝	2¾	12¾	2⅛	2,800	22,700	Virginia-Caro. Chem.	No	486,708	....	....	—.05	—2.44
27¾	31⅞	24¾	32⅛	15¾	74⅜	18½	1,500	12,000	6% cum. part. pfd.	100	213,392	....	....	5.88	.44
19¼	22½	18½	20⅛	10	27¼	10¾	2,300	5,200	Westvaco Chlorine	No	339,362	1.00	....	1.46	1.17
30¾	32⅛	30¼	31½	20	34⅞	21⅛	1,000	3,500	cum. pfd.	30	192,000	1.50	....	4.09	3.26
NEW YORK CURB EXCHANGE															
25¼	28⅜	22⅜	30¼	15½	37	17⅝	16,000	46,400	Amer. Cyanamid "B"	10	2,520,368	.45	....	2.09	1.77
89¼	90⅜	84	92	50	124	69	425	1,325	Celanese, 7% cum. 1st pfd.	100	148,179	8.53	....	22.32	24.47
4½	4½	4½	6¾	3	15	3	200	200	Celluloid Corp.	15	194,952	....	—2.73	—.92	—.80
...	...	...	12	6½	14⅝	10½	....	....	Courtauld's Ltd.	£1	24,000,000	.29	....	8.64%	8.30%
6	7	6	9⅞	6	10⅝	3½	200	500	Duval Texas Sulphur	No	500,000	....	....	.43	.61
41½	41½	38½	41¼	27	47½	31	400	1,700	Heyden Chem. Corp.	100	150,000	1.50	....	3.94	3.56
109	109	100	115½	55	147½	77	3,800	11,000	Pittsburgh Plate Glass	25	2,142,443	1.75	....	8.53	7.15
106	111	102	117¾	66	154¾	72¼	1,700	5,550	Sherwin Williams	25	633,927	2.50	....	8.44	8.04
114	114	112	114⅛	107	114	106¼	250	300	5% cum. pfd.	50	137,139	5.00	....	44.01	41.44
PHILADELPHIA STOCK EXCHANGE															
155	167	155	167	121½	179	115	50	50	Pennsylvania Salt	50	150,000	4.50	....	11.79	8.57

Feb. 1939 Last	Feb. 1939 High	Feb. 1939 Low	1938 High	1938 Low	1937 High	1937 Low	Sales February 1939	Sales 1939	Bonds	Date Due	Int. %	Int. Period	Outstanding $
NEW YORK STOCK EXCHANGE													
102⅛	102½	101	105⅜	99⅛	109½	99	274,000	539,000	Amer. I. G. Chem. Conv.	1949	5½	M-N	$25,300,000
23	25½	23	38	25⅛	42½	23	8,000	69,000	Anglo Chilean Nitrate inc. deb.	1967	4½-5	J	12,067,000
107¾	107¾	106⅞	106⅛	102⅜	102⅞	100⅛	4,000	13,000	Dow Chemical	1951	3	J-D	5,000,000
102	102½	101⅞	102¾	100	102	98¾	10,000	17,000	Int. Agric. Corp. 1st Coll. tr. stpd. to 1942	1942	5	M-N	5,633,000
23¼	25⅞	22⅝	35⅜	24¾	35⅜	21¼	82,000	217,000	Lautaro Nitrate n inc. deb.	1975	4	J-D	30,500,000
26	26	26	35⅜	24¾	25½	20½	1,000	1,000	Ruhr Chem.	1948	6	A-D	1,500,000
103⅞	105	103⅝	105	96½	102	93	275,000	893,000	Shell Union Oil	1951	3½	M-S	58,800,000
104¼	105	103¼	104⅜	90¼	102¾	94	53,000	234,000	Skelly Oil	1951	4	J-J	9,000,000
101½	103	101½	103	95	105	93½	8,000	34,000	Tenn. Corp. deb. "B"	1944	6	M-S	1,600,000
106⅜	108⅝	106	107⅜	103½	105¾	100	439,000	698,000	Texas Corp.	1951	3¼	J-D	60,000,000
101½	101⅜	99	101	77	111	81	73,000	175,000	Vanadium Corp. conv.	1941	5	A-O	2,800,000

* Paid in 1938, including extras but excluding dividends paid in stock. ** For either fiscal or calendar year.

Biennial Census of Manufactures

For additional data see Statistical and Technical Data Section, January, '39, pages 109-112; also February, '39, pages 229-232

Miscellaneous Chemicals, Part 1

Production by Kind, Quantity and Value '37 and '35

Part 1 covers the production of acetates, bicarbonates and carbonates, chlorides, phosphates and sulfates. All figures for 1937 are preliminary and subject to revision. All quantity figures represent production for sale and for interplant transfer unless specified as "Made and Consumed," tons, 2,000 lbs. unless otherwise stated.

	1937	1935
Miscellaneous chemicals, total value	**$126,078,309**	**$102,363,734**
Acetates, total value	**$20,587,200**	**$13,217,439**
Aluminum:		
Number of establishments	5	5
Tons[1]	(2)	175
Value	(2)	$30,285
Ammonium:		
Number of establishments	4	(2)
Pounds	46,435	
Value	$8,342	
Amyl:		
Number of establishments	9	10
Gallons	1,521,997	1,025,789
Value	$1,188,779	$789,293
Butyl:		
Number of establishments	9	9
Gallons	9,316,128	5,631,056
Value	$5,084,985	$3,686,689
Calcium:		
Number of establishments	21	24
Tons[3]	22,517	25,851
Value	$726,655	$825,522
Ethyl:		
Number of establishments	10	9
Gallons	6,946,081	5,563,199
Value	$2,919,201	$2,679,195
Chromium:		
Number of establishments	4	3
Pounds (basis 8½ to 12 per cent. Cr_2O_3)	811,587	630,023
Value	$37,459	$35,171
Lead:		
Number of establishments	4	5
Pounds	1,957,811	3,360,067
Value	$206,888	$252,799
Sodium:		
Number of establishments	7	(2)
Pounds	6,169,383	
Value	$244,003	
Other acetates, value	[4]$10,170,888	$4,918,485
Bicarbonates and carbonates, total value	**$43,088,703**	**$36,513,605**
Sodium bicarbonate, refined:		
Number of establishments	5	4
Tons (basis 100 per cent.	142,161	136,556
Value	$3,606,271	$3,658,321
Bismuth, subcarbonate:		
Number of establishments	5	6
Pounds	247,609	231,432
Value	$313,426	$364,265
Copper carbonate:		
Number of establishments	5	6
Pounds[5]	811,163	638,425
Value	$121,276	$89,536
Soda ash:		
Number of establishments	[6]17	16
Total production, tons	3,037,421	2,508,859
Made and consumed in same establishments, tons	713,662	637,224
Made for sale:		
Total tons	2,323,759	1,871,635
Total value	$33,768,770	$28,424,750
By process:		
Ammonia soda:		
Number of establishments	9	9
Tons	2,205,006	1,776,470
Value	$32,306,416	$27,212,035
Natural and electrolytic soda:		
Number of establishments	7	7
Tons	118,753	[8]95,165
Value	$1,462,354	$1,212,715
Calcium carbonate (precipitated chalk):		
Number of establishments	9	6
Tons	71,236	33,971
Value	$1,667,780	$859,649
Magnesium carbonate, precipitated:		
Number of establishments	7	7
Tons	6,505	7,301
Value	$788,215	$877,741
Sal Soda:		
Number of establishments	22	17
Tons	33,064	39,439
Value	$768,659	$1,021,308
Other bicarbonates and carbonates, value	[10]$2,054,306	$1,218,035
Chlorides, total value	**$19,783,203**	**[11]$16,945,748**
Aluminum (anhydrous, crystal and liquid):		
Number of establishments	10	10
Tons[12]	4,034	2,339
Value	$623,639	$397,295
Calcium:[13]		
Solid:		
Number of establishments	5	5
Tons (basis 73 to 75 per cent.)	4,882	7,526
Value	$85,556	$108,548
Flake:		
Number of establishments	5	4
Tons (basis 73 to 75 per cent.)	223,641	197,948
Value	$3,753,744	$3,205,727
Calcium Chloride (Cont'd)		
Liquid:		
Number of establishments	8	5
Tons (basis 75 per cent.)	35,089	21,527
Value	$341,724	$314,613
Iron—ferric and ferrous:		
Number of establishments	13	14
Pounds[12]	13,577,650	11,318,416
Value	$373,579	$291,875
Mercury—mercuric and mercurous:		
Number of establishments	5	5
Pounds	520,216	478,486
Value	$603,574	$428,402
Tin—stannic:		
Number of establishments	(14)	7
Pounds		15,640,763
Value		$3,976,487
Tin—stannous:		
Number of establishments	7	7
Pounds	460,841	477,229
Value	$180,499	$174,811
Ammonium (sal ammoniac):		
Number of establishments	9	8
Pounds	39,599,247	34,864,681
Value	$1,821,494	$1,583,613
Copper:		
Number of establishments	5	6
Pounds	95,452	77,290
Value	$19,640	$9,717
Gold:		
Number of establishments	5	5
Ounces	2,903	1,102
Value	$57,995	$24,404
Methyl:		
Number of establishments	4	3
Pounds	3,389,125	2,083,974
Value	$1,043,195	$688,927
Other chlorides, value	[15]$10,878,564	$5,741,329
Phosphates, total value	**$13,676,275**	**$14,189,574**
Calcium:		
Monobasic:		
Number of establishments	9	10
Tons	41,116	35,860
Value	$5,139,402	$4,665,301
Dibasic:		
Number of establishments	5	6
Tons	2,048	2,714
Value	$108,335	$208,035
Tribasic:		
Number of establishments	4	5
Tons	9,626	2,015
Value	$624,800	$242,249
Sodium:		
Tribasic:		
Number of establishments	12	14
Tons	100,550	87,109
Value	$3,922,434	$3,861,952
Dibasic:		
Number of establishments	10	12
Tons	17,425	35,444
Value	$752,094	$1,338,065

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	1937	1935
Sodium phosphate, monobasic and pyro (Cont'd)		
Monobasic and pyro:		
Number of establishments	9	6
Tons	12,989	4,517
Value	$1,749,275	$832,724
Meta:		
Number of establishments	3	4
Tons	7,748	5,147
Value	$946,002	$519,708
Other phosphates, value	[17]$433,933	$2,521,540
Sulfates, total value	$28,942,928	$21,497,368
Aluminum (concentrated alum):		
Number of establishments	21	22
Tons	394,438	348,030
Value	$8,782,089	$7,748,490
Aluminum-ammonium (ammonia alum):		
Number of establishments	9	7
Tons	14,397	5,188
Value	$505,954	$259,292
Barium (blanc fixe):		
Number of establishments	9	11
Pounds	10,396,178	7,809,136
Value	$278,186	$235,832
Copper (blue vitriol):		
Number of establishments	17	15
Pounds	71,917,889	54,759,439
Value	$4,073,654	$2,002,099
Iron (copperas):		
Number of establishments	21	23
Tons	45,150	31,852
Value	$466,832	$311,516
Magnesium (Epsom salt):		
Number of establishments	4	5
Tons	41,369	38,489
Value	$1,216,748	$1,116,533
Manganese:		
Number of establishments	5	4
Pounds[12]	14,127,276	6,211,704
Value	$333,033	$190,620
Potash and chrome alums:		
Number of establishments	6	5
Tons	3,227	2,666
Value	$203,960	$156,684
Sodium, total value	$5,103,926	$4,262,546
Anhydrous (refined):		
Number of establishments	7	8
Tons	[19]21,797	[19]23,609
Value	[19]$312,285	[19]$457,890
Glauber's salt:		
Number of establishments	15	19
Tons	[21]31,934	[21]39,961
Value	[21]$490,660	[21]$542,251
Hyposulfite (thiosulfate):		
Number of establishments	9	8
Tons	39,486	24,477
Value	$1,411,764	$1,054,264
Niter cake:		
Number of establishments	15	20
Total production, tons	36,086	28,252

	1937	1935
Niter Cake (Cont'd)		
Made and consumed in same establishments, tons	13,103	9,438
Made for sale:		
Number of establishments	13	17
Tons	22,983	18,814
Value	$521,601	$343,890
Salt cake (crude):		
Number of establishments	28	27
Total production, tons	269,177	192,384
Made and consumed in same establishments, tons	27,830	22,542
Made for sale:		
Tons	[22]241,347	[22]169,842
Value	[22]$2,367,616	[22]$1,864,251
Sodium-aluminum (Soda alum):		
Number of establishments	(20)	3
Tons		18,217
Value		$1,040,580
Zinc:		
Number of establishments	10	10
Pounds	37,888,157	37,465,565
Value	$1,132,032	$721,025
Ammonium:		
Number of establishments	18	18
Tons	102,248	96,229
Value	$2,417,634	$2,073,258
Other sulfates, value	[23]$4,428,880	$1,378,893

[1] Production in 1935, basis 20 per cent. For 1933, as reported, regardless of strength.
[2] Withheld to avoid disclosing approximations of data reported by individual establishments. Value included in "Other acetates."
[3] Production in 1937 and 1935, basis 80 per cent. For 1933, as reported, regardless of strength.
[4] Includes, in order of value, data for cellulose acetate, isopropyl acetate, aluminum acetate, potassium acetate, cobalt acetate, etc.
[5] For 1937 and 1935, 52 per cent. metallic content. For 1933, as reported, regardless of strength.
[6] Includes one establishment which reported no soda ash for sale.
[7] Includes two establishments which reported no soda ash for sale.
[8] Electrolytic production was for interplant transfer and not for sale.
[9] Natural process only.
[10] Includes, in order of value, potassium carbonate, barium carbonate, ammonium bicarbonate, ammonium carbonate, sodium carbonate, monohydrate, etc.
[11] Revised.
[12] For 1937 and 1935, 100 per cent. For 1933, as reported, regardless of strength.
[13] Data for calcium chloride made by establishments engaged primarily in production of salt included in 1933 but not for 1937 and 1935. Such production in 1937, reported by 4 establishments, amounted to 7,303 tons, valued at $66,591. In 1935, 8 establishments reported production of 8,044 tons, valued at $50,442.
[14] Data incomplete. Value included in "Other chlorides."
[15] Includes, in order of value, data for potassium chloride, stannic chloride, zinc chloride, sulfur chloride, barium chloride, etc.
[16] Not available.
[17] Includes value of ammonium phosphate, etc.
[18] Data incomplete.
[19] Includes data for anhydrous sodium sulfate made from brine.
[20] Withheld to avoid disclosing approximations of data for individual establishments. Value included in that of "Other sulfates."
[21] Includes data for Glauber's salt refined from natural product.
[22] Includes data for natural salt cake made from brines.
[23] Includes, in order of value, data for nicotine sulfate, soda alum, nickel sulfate, satin white, chromium sulfate, etc.

Part 2

Miscellaneous Inorganic Chemicals

	1937	1935
Miscellaneous inorganic chemicals, total value	$314,022,077	$196,147,280
Ammonia, anhydrous:		
Number of establishments	12	11
Pounds[1]	223,040,588	138,778,725
Value[1]	$8,867,638	$5,679,399
Ammonia, aqua and liquor:[3]		
Number of establishments	34	40
Pounds (NH_3 content)	25,461,214	23,915,726
Value	$1,310,227	$1,235,479
Bismuth subgallate:		
Number of establishments	6	5
Pounds	40,861	24,328
Value	$55,270	$38,686
Bromides, value	$7,057,218	$4,963,608
Calcium Carbide:		
Number of establishments	7	6
Tons	193,045	147,092
Value	$9,844,245	$6,234,380
Bleaching powder:[3]		
Number of establishments	14	16
Tons[4]	45,908	39,561
Value	$937,197	$909,071
Chlorates, value	$619,145	$410,499
Chromates and bichromates, total value	$6,464,596	$5,229,894
Sodium:		
Number of establishments	5	6
Tons	48,697	42,325
Value	$5,925,611	$4,762,728
Potassium:		
Number of establishments	6	5
Pounds	4,717,202	4,491,316
Value	$386,369	$359,366
Other chromates and bichromates, value	[6]$152,616	$107,800
Citrates, total value	$947,701	$1,356,874
Iron-ammonium:		
Number of establishments	4	4
Pounds	340,863	304,902
Value	$108,413	$123,643
Potassium:		
Number of establishments	3	3
Pounds	200,573	174,501
Value	$72,217	$65,761
Iron:		
Number of establishments	2	3
Pounds	(6)	5,785
Value		$4,223
Sodium:		
Number of establishments	5	$1,163,247
Pounds	3,064,445	
Value	$651,924	
Other citrates, value	$115,147	
Cyanides, total value	$4,883,777	$4,429,529
Copper:		
Number of establishments	4	4
Pounds	738,683	473,492
Value	$264,244	$169,557
Silver:		
Number of establishments	5	5

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	1937	1935
Silver Cyanide (Cont'd)		
Ounces	(7)	130,073
Value		$77,899
Other cyanides, value	[8]$4,619,533	$4,182,073
Ferro-alloys, electric-furnace:		
Number of establishments	22	18
Tons (2,240 pounds)	352,318	216,627
Value	$45,295,278	$23,489,764
Fluorides, value	$5,133,706	$1,969,219
Glycerophosphates, value	$227,743	$165,955
Hydroxides, total value	**$34,561,653**	**$30,295,190**
Potassium (caustic):		
Number of establishments	5	4
Tons[10]	10,839	9,518
Value	$1,437,509	$1,260,031
Sodium (caustic):		
Number of establishments	29	30
Total production, tons[11]	961,591	759,381
Made and consumed in same establishment, tons	71,315	39,171
Made for sale:		
Tons	890,276	720,210
Value	$31,797,329	$28,134,175
Production by process:		
Electrolytic:		
Number of establishments	23	22
Total production, tons	472,784	322,401
Made and consumed in same establishments, tons	64,442	34,881
Made for sale:		
Tons	408,342	287,520
Value	$13,906,703	$11,263,248
Lime-soda:		
Number of establishments	11	11
Total production, tons[12]	488,807	436,980
Made and consumed in same establishments, tons	6,873	4,290
Made for sale:		
Tons	481,934	432,690
Value	$17,890,626	$16,870,927
Other hydroxides, value	$1,326,815	$900,984
Hypophosphites, value	$73,968	$29,190
Iodides, total value	$793,609	$745,324
Potassium:		
Number of establishments	8	7
Pounds	612,696	433,489
Value	$599,027	$572,161
Sodium:		
Number of establishments	4	5
Pounds	42,062	38,024
Value	$81,413	$82,038
Thymol:		
Number of establishments	3	3
Pounds	8,402	6,615
Value	$27,919	$21,935
Other iodides, value	$85,250	$69,190
Iodine, resublimed:		
Number of establishments	8	6

	1937	1935
Iodine, resublimed (Cont'd)		
Pounds	369,270	199,816
Value	$399,088	$238,357
Lactates, value	$236,884	$91,487
Linoleates, total value	$176,443	$127,971
Cobalt:		
Number of establishments	(13)	4
Pounds		408,201
Value		$95,155
Other linoleates, value	$176,443	$32,816
Mercury, ammoniated:		
Number of establishments	5	6
Pounds	57,230	60,269
Value	$100,789	$82,275
Mercury, redistilled:		
Number of establishments	6	5
Pounds	162,196	74,817
Value	$221,801	$85,956
Modified sodas:		
Number of establishments	10	9
Tons	26,497	29,103
Value	$1,050,953	$1,140,022
Nitrates, except sodium, total value[14]	$4,334,591	$3,321,566
Bismuth, sub:		
Number of establishments	6	6
Pounds	262,867	269,193
Value	$309,678	$360,303
Silver (lunar caustic):		
Number of establishments	6	7
Ounces	7,249,421	5,194,507
Value	$2,284,922	$1,907,693
Ammonium:		
Number of establishments	10	9
Pounds	45,560,194	25,297,894
Value	$1,130,764	$673,704
Zinc:		
Number of establishments	3	3
Pounds	7,241	12,502
Value	$2,501	$2,594
Other nitrates, except sodium, value	$606,726	$377,272
Oxalates, total value	$254,439	$148,984
Iron:		
Number of establishments	2	3
Pounds	(15)	7,869
Value		$3,873
Other oxalates, value	$254,439	$145,111
Oxides, total value	$14,750,185	$8,770,428
Aluminum:		
Number of establishments	7	4
Tons	(16)	22,035
Value		$3,852,141
Mercury:		
Number of establishments	5	4
Pounds	162,224	119,813
Value	$218,075	$141,922
Tin:		
Number of establishments	7	7
Pounds	3,323,715	3,245,462
Value	$1,707,451	$1,685,692
Copper, cupric:		
Number of establishments	4	5
Pounds	(17)	1,169,875
Value		$219,486

	1937	1935
Copper Oxide (Cupric) (Cont'd)		
Chromium:		
Number of establishments	6	7
Pounds	2,875,060	3,480,585
Value	$603,000	$756,708
Other oxides, value	[18]$12,221,659	$2,114,479
Peroxides, total value	$7,360,376	$3,859,162
Hydrogen:		
Number of establishments	8	10
Pounds (basis 100 volumes)	35,040,378	17,409,092
Value	$6,351,703	$3,154,593
Other peroxides, value	[19]$1,008,673	$704,569
Resinates, total value	$145,316	$171,994
Cobalt:		
Number of establishments	3	4
Pounds	(20)	203,108
Value		$37,746
Manganese:		
Number of establishments	4	4
Pounds	(20)	599,299
Value		$60,092
Other resinates, value	$145,316	$74,156
Salicylates, total value	$565,690	$200,805
Magnesium:		
Number of establishments	3	3
Pounds	(21)	4,420
Value		$4,866
Other salicylates, value	$565,690	$195,939
Sodium aluminate:		
Number of establishments	6	6
Tons	7,238	6,770
Value	$437,625	$417,728
Sodium antimonate:		
Number of establishments	4	3
Pounds	4,347,866	4,100,543
Value	$554,047	$441,191
Sodium benzoate:		
Number of establishments	4	5
Pounds	(22)	1,354,893
Value		$391,332
Sodium borate (borax)[9]:		
Number of establishments	4	4
Tons	126,166	106,131
Value	$3,416,184	$3,693,129
Sodium hypochlorite:		
Number of establishments	63	53
Tons[23]	75,073	50,807
Value	$6,274,888	$4,304,921
Sodium silicate, total value	$8,354,849	$7,673,591
Liquid:		
Number of establishments	25	24
Tons (basis 40°)	600,979	577,587
Value	$6,786,715	$6,607,204
Solid:		
Number of establishments	13	13
Tons	40,473	30,536
Value	$1,568,134	$1,066,387
Sodium silicofluoride:		
Number of establishments	15	11
Tons	5,601	2,628

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	1937	1935
Sodium Silicofluoride (*Cont'd*)		
Value	$582,723	$202,677
Stearates, total value	$1,773,468	$1,108,726
Aluminum:		
Number of establishments	11	12
Tons	2,258	1,896
Value	$856,771	$633,274
Calcium:		
Number of establishments	8	8
Pounds	980,101	491,673
Value	$191,839	$90,582
Zinc:		
Number of establishments	10	10
Pounds	2,073,110	1,718,979
Value	$421,463	$322,500
Other stearates, value	$303,395	$62,370
Sulfides, total value	$2,408,544	$2,112,475
Sodium:		
Number of establishments	12	13
Tons[24]	31,419	24,884
Value	$1,594,360	$1,390,001
Ammonium:		
Number of establishments	4	5
Pounds (basis 100 per cent.)	(25)	842,248
Value		$85,730
Other sulfides, value	$814,184	$636,744
Sulfites, total value	$3,923,599	$3,752,458
Sodium, normal:[26]		
Number of establishments	8	7
Tons	12,491	6,840
Value	$781,877	$473,991
Sodium, formaldehyde, and zinc-hydro:		
Number of establishments	7	7
Pounds	16,032,500	15,076,836
Value	$2,503,683	$2,650,638
Other sulfites, value	$638,039	$627,829
Sulfur, refined:		
Number of establishments	11	9
Tons	(22)	47,504
Value		$1,649,758
Tartrates, total value	$1,302,411	$867,883
Potassium, bi-(cream of tartar):		
Number of establishments	4	4
Pounds	5,080,455	3,855,022
Value	$883,646	$641,971
Other tartrates, value	[27]$418,765	$225,912
Vitreous enamels ("frit"):		
Number of establishments	9	11
Pounds	76,527,104	73,397,433
Value	$5,201,732	$4,399,947
Other inorganic chemicals, value	[28]$123,122,481	[29]$59,710,396

[1] Includes production from ammonia liquor. Amount of such production for 1937, 2,662,290 pounds, valued at $246,297; for 1935, 2,990,685 pounds, valued at $388,699. No corresponding data available for 1933.

[2] Figures for 1937 and 1935, but not for 1933, include data for ammonia produced in Manufactured Gas Industry. For production in Coke Industry, see Bureau of Mines, report, "Coke and By-products," in Minerals Yearbook, 1938 and earlier years. [3] Sometimes called chloride of lime, calcium oxychloride, etc.

[4] Basis 35 to 37 per cent. [5] Includes, in order of value, data for lead chromate, ammonium chromate, etc.

[6] Withheld to avoid disclosing approximations of data reported by individual establishments. Value included in that of "Other citrates."

[7] Withheld to avoid disclosing approximations of data reported by individual establishments. Value included in that of "Other cyanides."

[8] Includes, in order of value, data for sodium cyanide, sodium ferrocyanide, silver cyanide zinc cyanide, potassium ferrocyanide and ferricyanide, etc., [9] Not available.

[10] For 1937 and 1935, basis 100 per cent. For 1933, as reported, regardless of strength.

[11] Not including sodium hydroxide made and consumed in establishments classified in Wood Pulp and Textile industries.

[12] Includes output of 2 establishments that produced caustic from natural soda ash.

[13] Quantity incomplete. Value included in that of "Other linoleates."

[14] Data for sodium nitrate withheld to avoid disclosing an approximation of the output of an individual establishment. Value included in that of "Other inorganic chemicals."

[15] Withheld to avoid disclosing approximations of data reported by individual establishments. Value included with that of "Other oxalates." [16] Quantity incomplete. Value included in that of "Other oxides."

[17] Withheld to avoid disclosing approximations of data reported by individual establishments. Value included in that of "Other oxides."

[18] Includes, in order of value, data for aluminum oxide, titanium dioxide, antimony oxide, zinc oxide, iron oxide, arsenic trioxide, magnesium oxide, etc.

[19] Includes, in order of value, data for sodium peroxide, barium peroxide, lead peroxide, etc.

[20] Withheld to avoid disclosing approximations of data reported by individual establishments. Value included in that of "Other resinates."

[21] Withheld to avoid disclosing approximations of data reported by individual establishments. Value included in that of "Other salicylates."

[22] Withheld to avoid disclosing approximations of data reported by individual establishments. Value included in that of "Other inorganic chemicals."

[23] Production in 1937 and 1935, basis 15 per cent. For 1933, as reported, regardless of strength.

[24] Production in 1937 and 1935, basis 60 to 62 per cent. For 1933, as reported, regardless of strength.

[25] Withheld to avoid disclosing approximations of data reported by individual establishments. Value included in that of "Other sulfides."

[26] Anhydrous and crystal.

[27] Includes data for potassium-sodium tartrate, etc.

[28] Includes, in order of value, data for aluminum metal, sodium nitrate (refined), calcium molybdate, sodium metal, sulfur (refined), silicon carbide, yellow phosphorus, calcium hypochlorite (true), sodium perborate, sodium nitrite, sodium succinate, etc. [29] Revised.

Part 3
Miscellaneous Organic Chemicals

	1937	1935
Miscellaneous organic chemicals, total value	$331,891,720	$237,930,839
Acetone:		
Number of establishments	9	7
Pounds	84,369,475	68,921,870
Value	$2,845,436	$2,642,149
Alcohols:		
Methyl, synthetic:		
Number of establishments	6	6
Gallons	[2]33,374,015	13,359,247
Value	$9,108,363	$3,611,382
Amyl, including refined fusel oil:		
Number of establishments	11	11
Pounds	(3)	5,160,604
Value		$568,111
Butyl:		
Number of establishments	8	6
Pounds	79,933,577	35,877,675
Value	$5,866,588	$2,601,983
Ethyl, and other alcohols,[4] value	$37,313,508	$36,299,499
Carbon bisulfide:		
Number of establishments	10	9
Pounds	155,237,735	117,757,762
Value	$4,753,748	$3,384,851
Carbon tetrachloride:		
Number of establishments	6	5
Pounds	78,708,690	51,970,367
Value	$3,067,611	$2,149,877
Chloroform:		
Number of establishments	4	4
Value	(1)	1,799,437
Pounds		$324,091
Citral:		
Number of establishments	7	4
Pounds	17,175	11,340
Value	$28,386	$21,698
Ester gum:		
Number of establishments	20	17
Pounds	25,589,993	21,372,890
Value	$2,212,945	$1,481,880
Ether (ethyl):		
Number of establishments	7	7
Pounds	13,097,484	7,915,299
Value	$1,651,846	$1,305,459
Geraniol:		
Number of establishments	8	8
Pounds	166,942	111,096
Value	$126,816	$147,767
Glycerin, crude:		
Number of establishments	62	51
Pounds	24,180,767	24,042,800
Value	$3,592,537	$2,366,481
Glycerin, dynamite grade:[6]		
Number of establishments	22	23
Pounds	43,586,391	118,726,871
Value	$7,822,600	$12,973,082
Glycerin, chemically pure:[6]		
Number of establishments	29	
Pounds	78,813,063	
Value	$13,459,921	
Vanillin:		
Number of establishments	5	6
Pounds	348,461	236,896
Value	$1,159,614	$684,723
Coal-tar products, total value[7]	$159,518,470	$120,581,844
Crudes[8]	$29,470,712	$19,173,099
Intermediates	$37,139,727	$29,360,324
Finished products[7]	$92,908,031	$72,048,421
Carbon, activated:		
Number of establishments	8	8
Tons	10,655	11,477
Value	$1,443,936	$925,634
Other organic chemicals, value	[10]$77,919,395	$45,860,328

[1] Withheld to avoid disclosure of data reported by individual establishments. Value included in "Other Organic Chemicals."

[2] In addition, 3,437,758 gallons of refined natural methanol, valued at $1,030,534, was produced for sale in the Wood Distillation and Charcoal Manufacture industry.

[3] Withheld to avoid disclosure of data reported by individual establishments. Value included in "Ethyl and Other Alcohols."

[4] The production of ethyl alcohol, as reported to the Bureau of Internal Revenue, Treasury Department, was 215,438,282 proof gallons in 1937, 193,218,597 proof gallons in 1935, and 138,600,000 proof gallons in 1933.

[5] Data incomplete. Value included in that of "Other Organic Chemicals."

[6] Reported as "refined" in 1935 and 1933.

[7] Figures for 1937 and 1935 do not include data for color lakes, statistics for which are given in report for Paints, Pigments and Varnishes, nor for certain other coal-tar chemicals, figures for which will be found in other tables for the Chemical group. Data for these classes of products are included in the figures for 1933. See also Tariff Commission report No. 132 entitled "Dyes and Other Synthetic Organic Chemicals in the United States, 1937."

[8] Not including by-product crudes made in coke plants and gas works.

[9] Not available.

[10] Includes, in order of value, data for tetraethyl lead, nitrocellulose (not plastic), ethylene glycol, formaldehyde, casein, trichlorethylene, etc.

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Agricultural Chemicals

Nitrogenous fertilizer prepared by treating a porous organic carrier material at a temperature above 180° C. with both an added agent and an acid phosphate. No. 2,142,965. William J. Hale to Dow Chemical Co., both of Midland, Mich.

Preparation a water-insoluble complex silicate of mercury which comprises intermixing an alkali silicate solution containing ammonia with a solution of mercuric chloride. No. 2,143,282. Alwyn C. Sessions, New Brunswick, N. J., to California Spray-Chemical Co., Berkeley, Calif.

Treatment phosphate rock to eliminate fluorine and render it available as a plant food. No. 2,143,865. Raymond L. Copson, near Sheffield, Ala.

Production a soluble phytonomic insecticidal oil. No. 2,144,260. William H. Hampton and Norman N. Gay, Berkeley, Calif., to Standard Oil Co. of Calif., San Francisco, Calif.

Insecticide comprising an easily oxidizable organic vegetable toxic material of the group of pyrethrum and rotenone and a phenol to stabilize same. No. 2,144,366. Dalton B. Faloon to Hammond Paint & Chemical Co., both of Beacon, N. Y.

Insecticide comprising a volatile solvent vehicle, and easily oxidizable organic vegetable toxic material of the group of pyrethrum and rotenone dissolved therein, and a naphthol to stabilize same. No. 2,144,367. Dalton B. Faloon to Hammond Paint & Chemical Co., both of Beacon, N. Y.

Insecticide comprising an easily oxidizable organic vegetable toxic material of the group of pyrethrum and rotenone, and a naphthylamine to stabilize same. No. 2,144,368. Dalton B. Faloon to Hammond Paint & Chemical Co., both of Beacon, N. Y.

Insecticide comprising an easily oxidizable organic vegetable toxic material of the group of pyrethrum and rotenone, and an aromatic amine. No. 2,144,369. Dalton B. Faloon to Hammond Paint & Chemical Co., both of Beacon, N. Y.

Insecticide comprising a mineral oil continuous phase having an aqueous phase dispersed therein. No. 2,144,808. Wm. B. Parker, Placerville, Calif., to California-Spray Chemical Corp., Berkeley, Calif.

Insecticidal and fungicidal composition comprising sulfur and an organic nitro-compound. No. 2,145,259. Sheldon B. Heath to Dow Chemical Co., both of Midland, Mich.

Cellulose

Process for improving properties of artificial films having a basis of an organic derivative of cellulose. No. 2,142,718. Henry Dreyfus, London, England.

Process for improving strength of filaments, foils, and similar materials of organic derivatives of cellulose. No. 2,142,719. Henry Dreyfus, London, and Robert Wighton Moncrieff and Frank Brentnall Hill, Spondon, near Derby, England, to Celanese Corp. of America, corp. of Delaware.

Production low twist yarn of improved tenacity. No. 2,142,720. Henry Dreyfus, London, and Robert Wighton Moncrieff and Frank Brentnall Hill, Spondon, near Derby, England, to Celanese Corp. of America, corp. of Delaware.

Process for improving strength of filaments, threads, and similar textile materials and foils, films, etc., made of an organic substitution derivative of cellulose. No. 2,142,721. Henry Dreyfus, London, and Donald Finlayson, Spondon, near Derby, England, to Celanese Corp. of America, corp. of Delaware.

Process for improving strength of filaments, threads and similar textile materials and foils, films, etc., made of an organic substitution derivative of cellulose. No. 2,142,722. Henry Dreyfus, London, and Robert Wighton Moncrieff and Frank Brentnall Hill, Spondon, near Derby, England, to Celanese Corp. of America, corp. of Delaware.

Treatment threads, foils, and similar materials with fluid media under pressure. No. 2,142,890. Henry Dreyfus, London, and Robert Wighton Moncrieff and William Macintosh Glass, Spondon, near Derby, England, to Celanese Corp. of America, corp. of Del.

Process for improving strength of artificial threads, foils, and similar materials. Nos. 2,142,909 and 11. Robert Wighton Moncrieff and Frank Brentnall Hill, Spondon, near Derby, England, to Celanese Corp. of America, corp. of Delaware.

Treatment cellulose derivative materials. No. 2,142,912. Robert Wighton Moncrieff and Frank Brentnall Hill, Spondon, near Derby, England, to Celanese Corp. of America, corp. of Delaware.

Method coagulating solutions of carboxylic acid esters of cellulose; introducing solutions into a neutral organic coagulating liquid having M. P. below + 2°C. and cooled below + 2°C. No. 2,143,205. Richard Muller, Berlin-Schoneberg, and Alfred Lubke, Mannheim-Waldhof, Germany, to C. F. Boehringer & Sohne, G. m. h. H., Mannheim-Waldhof, Germany.

Production cellulose esters. No. 2,143,332. Otto Sindl, Paris, France, and Georg Frank, Moedling, near Vienna, Austria, to "Afag" Finanzierungs A. G., Schaffhausen, Switzerland.

Method decolorizing tinted cellulose derivative scrap; subjecting same in its original physical condition to action of a bleaching bath containing a chlorinated bleaching agent and methanol. No. 2,143,629. Gale F. Nadeau and Marvin J. Reid, Rochester, N. Y., to Eastman Kodak Co., Jersey City, N. J.

Preparation cellulose for acylation, impregnating same with a mixture of acetic and sulfuric acids containing lower organic acid anhydride. No. 2,143,785. Carl J. Malm to Eastman Kodak Co., both of Rochester, N. Y.

Preparation an alkali cellulose adapted to production of low viscosity water-insoluble cellulose ethers. No. 2,143,855. Shailer L. Bass to Dow Chemical Co., both of Midland, Mich.

Preparation an alkali cellulose adapted to production of ethyl cellulose having viscosity in the range from about 0.15 to 2.0 poises. No. 2,143,857. Edgar C. Britton and Walter J. LeFevre, Midland, Mich., and Earl G. Hallonquist, Shelton, Wash., to Dow Chemical Co., Midland, Mich.

Preparation alkali cellulose adapted to production of cellulose ethers; disintegrating same by subjecting mass thereof to the action of differential speed rollers. No. 2,143,862. William R. Collings, Lee DePree, and Merrill H. Weymouth to Dow Chemical Co., all of Midland, Mich.

Preparation uniform alkali cellulose adapted to production of cellulose ethers. No. 2,143,863. Wm. R. Collings, Lee DePree and Merrill H. Weymouth to Dow Chemical Co., all of Midland, Mich.

Manufacture, by the viscose process, of color-fast, delustered, regenerated cellulose thread. No. 2,143,883. Hayden B. Kline and Emerson B. Helm, to Industrial Rayon Corp., all of Cleveland, O.

Process saponifying shaped articles from cellulose esters; performing saponification with an aqueous medium containing inorganic alkali and an organic onium compound, capillary active and soluble in said medium. No. 2,144,202. Paul Schlack, Berlin-Lichtenberg, Germany, to I. G., Frankfort-am-Main, Germany.

Manufacture continuous, regenerated cellulosic pellicle. No. 2,144,356. Francis P. Alles, Buffalo, N. Y., to du Pont, Wilmington, Del.

Method forming moistureproof cellulosic pellicles; first forming dispersion of a moistureproofing agent in an aqueous solution of a cellulosic material, in final step impregnating pellicle with a blending agent. No. 2,144,383. Frederick M. Meigs, Niagara Falls, N. Y., to du Pont, Wilmington, Del.

Manufacture by viscose process of artificial silk thread or the like. No. 2,144,629. Hayden B. Kline, Walter F. Kneubusch, and Alden M. Burkholder to Industrial Rayon Corp., all of Cleveland, O.

Process for improving handle of materials made from organic esters of cellulose. No. 2,144,633. Robert Wighton Moncrieff and Frank Brentnall Hill, Spondon, near Derby, England, to Celanese Corp. of America, corp. of Del.

Production water impermeable, shaped cellulose formate products. No. 2,144,703. Walter Konig, Wiesbaden, Germany, to Rudolph Koepp & Co. Chemische Fabrik A. G., Oestrich in Rheingau, Germany.

Manufacture viscose artificial silk according to the bobbin spinning system. No. 2,145,004. Paul Esselmann, Wolfen, Kreis Bitterfeld, Germany, to I. G., Frankfort-am-Main, Germany.

Preparation cellulosic material containing tetrahydrofuroyl groups combined with the cellulose. No. 2,145,110. Jos. B. Dickey and James G. McNally to Eastman Kodak Co., all of Rochester, N. Y.

Preparation cellulose esters; reacting cellulose with an alkali metal amide in medium of liquid ammonia. No. 2,145,273. Floyd C. Peterson, Syracuse, N. Y., and Arthur J. Barry, Midland, Mich., to Dow Chemical Co., Midland, Mich.

Process for locally saponifying threads, ribbons, films, etc., having basis of organic ester of cellulose. No. 2,145,364. Robt. Wighton Moncrieff and Chas. Wm. North, Spondon, near Derby, England, to Celanese Corp. of America, corp. of Del.

Manufacture yarn of artificial origin, wherein a cellulosic solution is extruded through minute orifices into a coagulating medium to form filaments and the like. No. 2,145,527. James J. Polak, Arnhem, and Johannes G. Weeldenburg, Ede, Netherlands, to American Enka Corp., Enka, N. C.

Spinning solution for manufacture dyed artificial products, comprising a cellulosic solution of the group of viscose and cuprammonium cellulose, and an organic dyestuff. No. 2,145,580. Rudolph S. Bley, Milligan College, Tenn., to North American Rayon Corp., New York City.

Chemical Specialty

Product comprising a non-volatile organic combustible material and a compound of formula $(R'\text{-}NH\text{-}SO_3)_xR$, which acts as a fire retardant. No. 2,142,115. Martin Eli Cupery to du Pont, both of Wilmington, Del.

Non-fibrous cellulosic structure containing, as a flameproofing and softening agent, a compound of the formula $(R'\text{-}NH\text{-}SO_3)_xR$. No. 2,142,116. Martin Eli Cupery to du Pont, both of Wilmington, Del.

Method giving block of granite a smooth, light-colored finish, by thoroughly washing a rough-finished uniform surface, then giving same a final grinding with an intimate mixture of small steel shot and talc. No. 2,142,146. Robert B. Perry, Waterbury, Vt., to Rock of Ages Corporation, Barre, Vt.

Water-softening cleanser in free-flowing, dustless, sifting powder form, whose particles are uniformly composed of the reaction product of sodium sesquicarbonate, trisodium phosphate, and normally solid commercial soap-making fatty acids of not less than 98% free fatty acid content. No. 2,142,180. Bert O. Crites, University Heights, O., to Climalene Co., Canton, O.

Improved lubricant comprising blend of a wax-containing viscous hydrocarbon oil and products obtained by dissolving rubber in a low boiling mineral oil fraction, adding anhydrous aluminum chloride, and effecting conversion of the rubber with the aid of heat. No. 2,142,219. Erich M. Steffen, Berlin, Germany, three-fourths to Tide Water Associated Oil Co., New York City.

Preparation washed out reliefs containing alcohol soluble proteins as colloids, using chemical solution in process. No. 2,142,311. Johannes Heidenhain, Berlin, Germany.

Method treating oil for lubricating use; incorporating rubber in the oil, and injecting steam directly in the oil and heating. No. 2,142,327. John M. Musselman, to Standard Oil Co., both of Cleveland, O.

Insulating material in gel form, comprising a binder consisting of an asphalt gel, a volatile diluent, and comminuted cork suspended in binder. No. 2,142,584. William C. Ferguson, St. Louis, Mo.

Prevention offset; first providing rolling surface having minute depressions therein and moving same through a transparent solution comprising a cellulose derivative and an evaporable solvent. No. 2,142,666. Edmund H. Bucy, Stamford, Conn., to Atlas Powder Co., Wilmington, Del.

Composition for prevention of offset of freshly printed sheets, composed of cellulose acetate, ethylene dichloride, alcohol, and ethyl lactate. No. 2,142,667. Edmond H. Bucy, Stamford, Conn., to Atlas Powder Co., Wilmington, Del.

Cellulose derivative anti-offset composition. No. 2,142,668. Edmond H. Bucy, Stamford, Conn., to Atlas Powder Co., Wilmington, Del.

Warp sizing for rayon yarns, being an aqueous mixture composed of a water-miscible binder and a water-softening agent. No. 2,142,801. James T. Power, Wilmington, Del., and Ernest G. Talmy, Tamaqua, Pa., to Atlas Powder Co., Wilmington, Del.

A readily soluble, non-caking, non-hygroscopic detergent compound, composed of a hydrated complex of trisodium phosphate and sodium carbonate. No. 2,142,870. Lloyd A. Hall and Carroll L. Griffith, Chicago, Ill., to Griffith Labs., corp. of Illinois.

Production a homogeneous stable alkaline detergent containing sodium borate and phosphate compounds in solid solution. No. 2,142,871. Lloyd A. Hall, Chicago, Ill., to Griffith Labs., corp. of Illinois.

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Treatment mineral lubricating oil by sulfurizing. No. 2,142,916. George L. Parkhurst to Standard Oil Co., both of Chicago, Ill.

Defeathering compound to be applied hot, including paraffin and ozokerite. No. 2,142,938. Harry W. Dippel, Teaneck, N. J., to Charles V. Rosenberger, Independence, Iowa.

Manufacture a powdered or granular soap. No. 2,142,983. Benjamin H. Thurman, Bronxville, N. Y., to Refining, Inc., Reno, Nev.

Preparation extreme pressure lubricants. No. 2,142,998. Martin B. Chittick, Wilmette, Ill., to Pure Oil Co., Chicago, Ill.

Production cast concrete article having a glossy surface resistant to water spotting, surface being treated with a magnesium fluosilicate solution. No. 2,143,004. Oswald H. Greager and Gordon D. Patterson to du Pont, all of Wilmington, Del.

Detergent composition comprising water-soluble soap having dispersed therein a petroleum extract having an aniline point below 70° F., composed largely of unsaturated, cyclic non-benzenoid, and aromatic hydrocarbons. No. 2,143,066. Wm. H. Hampton, Berkeley, Calif., to Standard Oil Co. of Calif., San Francisco, Calif.

Lubricants comprising lubricating oils having incorporated therein hydroxylated acetals. No. 2,143,142. Melvin A. Dietrich to du Pont, both of Wilmington, Del.

Casein paint composition comprising water as a vehicle, pigment, casein, dissolved alkaline agent, a water-resistant, water-insoluble metallic soap, and a volatile water-immiscible solvent. No. 2,143,334. Wellington Lee Tanner, Panasoffkee, Florida.

Rendering textiles resistant to creasing, by causing a salt of an aliphatic amine containing more than 5 carbon atoms in the molecule and an aldehyde to act on the materials, then heating to an elevated temperature. No. 2,143,352. Ernst Koch, Georg Schulz, and Alfred Eckelmann to I. G., all of Frankfort-am-Main, Germany.

Waterproof roof coating composition characterized by resistance to cracking and checking at temperatures as low as about 32° F., and to creeping and running when hot. No. 2,143,387. Lyman E. Rutter, Barnsdall, Okla.

Manufacture cement. No. 2,143,395. Mikael Vogel-Jorgenson, Frederiksburg, near Copenhagen, Denmark, to Separation Process Co., Catasauqua, Pa.

Powder for prevention slippage of rugs on floors, which is non-softening at ordinary temperatures, non-sticky, and non-tacky. No. 2,143,479. Gustavus J. Esselen, Swampscott, Mass., to Specialty Guild, Inc., Morristown, N. J.

Method curing concrete, by application to same, before it has set, of a homogeneous water-impervious film to prevent evaporation of water during curing period. No. 2,143,515. Harold P. Hayden, Woodbridge, N. J., to Barber Asphalt Corp., Phila., Pa.

Protection wood against termites, using medium composed of tricresyl phosphate, said medium being free from lacquer bases. No. 2,143,639. Amerigo F. Caprio, Newark, N. J., to Celluloid Corp., corp. of N. J.

Adhesive coating, binder, and filler composition made by reacting anhydrous monosodium phosphate with a water-soluble borate of an alkaline metal. No. 2,143,641. Harry Bennett and Jos. Starobin, New York City, Starobin assignor to Bennett.

In an electric device, a dielectric composition consisting of a liquid mixture of isomers of trichlor benzyl cyanide. No. 2,143,685. Frank M. Clark, Pittsfield, Mass., to General Electric Co., corp. of N. Y.

Process and composition for improving rubber compounds. No 2,143,721. Harold A. Sweet, Westfield, N. J., to General Dyestuff Corp., New York City.

Decalcomania adhesive composed of glue and glycerol, dissolved in water containing monobutyl ether of ethylene glycol. No. 2,143,868. Peter D. Dexheimer, Mount Penn, Pa., to Glidden Co., Cleveland, O.

Composition made by heating together a phthalic anhydride-glycerol condensation product and cashew nut shell liquid. No. 2,143,880. William A. Hughes, Morristown, N. J., to Harvel Corp., corp. of N. J.

Composition for forming cores, composed of sand, a solution of sugar in water, and a binder material selected from group of substances consisting of drying oils, gums, and resins. No. 2,143,930. Nels G. Anderson, Detroit, Mich., to Aristo Corp., corp. of Michigan.

Grease composition consisting of soap, heavy hydrocarbon oil, glycerine, and an oxygenated pitch. No. 2,144,077. Eger V. Murphree, Summit, and William J. Sweeney, Elizabeth, N. J., to Standard Oil Development Co., corp. of Del.

Liquid mineral oil lubricating composition containing approximately 1% aluminum dinaphthenate dissolved therein. No. 2,144,078. George L. Neely, Berkeley, Calif., to Standard Oil Co. of Calif., San Francisco, Calif.

Method beneficiating inferior cement raw materials. No. 2,144,254. Charles H. Breerwood, Narberth, Pa., to Separation Process Co., corp. of Del.

Preparation tanning substances; treating lignin sulfonic acid with a condensation product of an aromatic hydroxy compound. No. 2,144,297. Hermann Noerr and Gustav Mauthe, Leverkusen-I. G. Werk, Germany, to I. G., Frankfort-am-Main, Germany.

Compounded lubricating oil suitable for use in an internal combustion engine, consisting of a petroleum lubricating oil having in admixture therewith castor oil, rapeseed oil, and a stabilizing agent. No. 2,144,469. William E. Townsend, Brooklyn, N. Y., and Robert O. Maxwell, Elizabeth, N. J., to A. G. Richardson & Co., New York City.

Aqueous carroting solution for treating animal or like fibres; containing, each in the presence of the other, an acid hydrolyzing agent, an oxidizing agent, and a protecting agent for the natural pigment. No. 2,144,487. Constantine F. Fabian, Brookfield, Conn., and Alexander N. Sachanen, Woodbury, N. J., to Non-Mercuric Carrot Co., Danbury, Conn.

Preparation vegetable gum solutions from raw vegetable gum, using aluminum sulfate in process. No. 2,144,522. Robt. C. Braun, Clifton, N. J. to Jacques Wolf & Co., Passaic, N. J.

Foundry mold having facing consisting of granular refractory alumina bonded with cement. No. 2,144,532. John Howe Hall, Germantown, Pa., to Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.

Composition for prevention tarnish on silver; emulsion of carnauba wax, stearic acid, triethanolamine, and water. No. 2,144,642. Philip Stoughton, New York City, and Robert F. Davis, Washington, D. C., Stoughton assignor to Davis.

Production high viscosity index lubricating oil. No. 2,144,652. Luther D. Fulton, Titusville, and Jos. M. Hinman, Rouseville, Pa., to Pennzoil Co., Oil City, Pa.

Production oxidized blended asphalt. No. 2,144,694. Percy L. Smith, Beaumont, Tex., Vladimir L. Shipp, New York City, and Arthur H. Boenau, Long Island City, N. Y., to Socony-Vacuum Oil Co., New York City.

Lubricant comprising a mineral lubricating oil and acorn oil. No. 2,144,773. Robt. W. Provine and Harry T. Bennett to Mid-Continent Petroleum Corp., all of Tulsa, Okla.

Corrosion inhibitor; the product of reaction between a pyridine compound and maleic anhydride. No. 2,144,913. Percy J. Cole, Phila., Pa., to Barrett Co., New York City.

Dry powder, stable on storage and having detergent and disinfecting properties, comprising crystallized sodium carbonate, crystallized disodium phosphate, and sodium hypochlorite. No. 2,145,015. Max Y. Seaton, Greenwich, Conn., to Westvaco Chlorine Products Corp., New York City.

Preparation an amylaceous, remoistening adhesive consisting of a British gum converted to a solubility of from about 70% to 95% in water at 75° F., and a dextrin content less than about 55%. No. 2,145,195. Hans F. Bauer, Chicago, Jordan V. Bauer, Elmwood Park, and Don M. Hawley, Geneva, Ill., to Stein, Hall Mfg. Co., Chicago, Ill.

Mothproofing composition containing a para tertiary amyl phenolic salt of dixylyl guanidine. No. 2,145,214. David Walker Jayne, Jr., Elizabeth, N. J., to American Cyanamid Co., New York City.

Solution for cleaning metal preparatory to painting; mixture of phosphoric acid, mono butyl ether of ethylene glycol, and a water solution of a sulfonated aniline in which the hydrogens of the amino group have been replaced by a long straight chain radical such as found in soap. No. 2,145,291. Clete L. Boyle, Detroit, Mich.

Soldering flux having incorporated therein a wetting agent consisting of an alkyl or aralkyl derivative of alpha amino alpha sulfonated propionic acid. No. 2,145,292. Clete L. Boyle, Detroit, Mich.

Adhesive; reaction product of an alkali cellulose with compounds of the formula $X\text{-}(CH_2CH_2O)_nCH_2CH_2OH$, where X is a halogen and *n* a number less than 6. No. 2,145,303. Winfred Hentrich, Dusseldorf-Reisholz, and Rudolf Kohler, Dusseldorf, Germany, to Henkel & Cie, G. m. b. H., Dusseldorf-Halthausen, Germany.

Foundry core binder; including soluble crystallizable carbohydrate material and soluble protein material. No. 2,145,317. Harold K. Salzberg, Pittsburgh, Pa., to Borden Co., New York City.

Insulated electrical conductor; insulating coating consisting of a plastic linear polymer of isobutylene having a molecular weight greater than about 1,000. No. 2,145,350. Robt. T. Haslam, Westfield, N. J., to Standard Oil Development Co., corp. of Del.

Seed disinfectant composition; bringing into contact a soluble mercury salt, an olefinic hydrocarbon, and a trihalogenated aldehydic carbonyl compound in presence of an inert solid diluent, whereby a reaction takes place. No. 2,145,594. Karl Gornitz, Teltow, and Willy Harnack and Otto Wurm, Berlin-Friedrichshagen, Germany, to Schering-Kahlbaum A. G., Berlin, Germany.

Seed disinfectant composition comprising an organic mercury compound. No. 2,145,595. Karl Gornitz, Teltow, and Willy Harnack and Otto Wurm, Berlin-Friedrichshagen, Germany, to Schering-Kahlbaum A. G., Berlin, Germany.

Heat molded composition tile, comprising an inert fibrous filler bound with a paracoumarone resin and nitrocellulose, rendered compatible with each other by a quantity of an aliphatic ether of cellulose. No. 2,145,648. Charles E. Fawkes, Chicago, Ill., and George P. Heppes, Upper Montclair, N. J., to Tile-Tex Co., Chicago Heights, Ill.

Method and apparatus for making non-bleeding blueprints, using chemical coating in process. No. 2,145,752. Harold J. Brunk, Chicago, Ill., to C. F. Pease Co., corp. of Del.

Metallic abrasive material composed of carbon, manganese, silicon, sulfur, phosphorus, chromium, vanadium, and iron. No. 2,145,757. John F. Ervin, Ann Arbor, Mich.

Manufacture light-colored lubricating oil of low residual carbon content from a petroleum residue. No. 2,145,828. Louis A. Clarke, Fishkill, and Edwin C. Knowles, Beacon, N. Y., to Texas Co., New York City.

Coal-Tar

Preparation phthalic anhydride by the catalytic oxidation of polynuclear aromatic hydrocarbons in vapor phase. No. 2,142,678. Frank Porter, Syracuse, N. Y., to Solvay Process Co., New York City.

Preparation aminoarysulfonylamino aliphatic acids and their salts. No. 2,142,847. Martin E. Hultquist, Plainfield, N. J., to Calco Chemical Co., Bound Brook, N. J.

Treatment high boiling oils contained in pure still residues resultant from fractionation of the cuts of coke oven light oils. No. 2,143,474. Wm. H. Carmody to Neville Co., both of Pittsburgh, Pa.

Manufacture condensation products of totally hydrolized protein material. No. 2,143,490. Georg Meyer, Cologne-Mulheim, Germany, to General Aniline Works, New York City.

Preparation benzene derivatives. No. 2,143,509. Courtney Conover and Arthur E. Huff, to Monsanto Chemical Co., all of St. Louis, Mo.

Sulfonating a nitro-naphthalene in presence of a mixture of a strong sulfonating agent and salt of a non-volatile acid. No. 2,143,963. John M. Tinker, Penns Grove, N. J., to du Pont, Wilmington, Del.

Intermediate for water-insoluble azo dyestuffs. No. 2,144,704. Friedrich Muth, Leverkusen-I. G. Werk, Germany, to General Aniline Works, New York City.

Preparation a halogenated peri-naphthindenone. No. 2,145,051. Karl Koeberle, Werner Rohland, and Christian Steigerwald, Ludwigshafen-am-Rhine, Germany, to General Aniline Works, New York City.

Purification nitrobenzene, using sodium sulfate in process. No. 2,145,200. Harold J. McCreary, Lombard, Ill., to Chicago Television & Research Labs., corp. of Ill.

Coatings

Manufacture artificial leather. No. 2,142,292. Steven Jan Blaupot ten Cate, Kootwijk, Netherlands.

Manufacture artificial thread formed from an organic derivative of cellulose and characterized by a fine denier, high tensile strength and a fibrous structure under Roentgen ray examination. No. 2,142,389. Karl Weissenberg, Berlin-Zehlendorf, and Bruno Rabinowitsch, Berlin, Germany, Rabinowitsch assignor to Weissenberg.

Material embodying cellulosic fibres that are to be subjected to immersion in water, said fibres having been impregnated with a cyclohexanone-phenol condensation product to render them more resistant to decay and weakening produced by bacterial and other actions resulting from immersion in water. No. 2,142,604. Thomas S. Carswell, Kirkwood, Mo., to Monsanto Chemical Co., St. Louis, Mo.

Treatment textiles of natural or regenerated cellulose; first impregnating same with a neutral aqueous solution of a primary condensation compound of urea, or a derivative thereof, with formaldehyde. No. 2,142,623. John Rex Whinfield to Calico Printers' Ass'n, both of Manchester, England.

Improving artificial silk fabrics by treatment with a derivative of

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abietinylamine. No. 2,142,688. Karl Brodersen and Matthias Quaedvlieg, Dessau in Anhalt, Germany, to I. G., Frankfort-am-Main, Germany.

Coating composition comprising an aqueous vehicle and an acid addition salt of a reaction product of a protein with a carbonyl compound and an amine having less than 9 carbon atoms, in which the amino-nitrogen is joined to at least one hydrogen atom, the remaining valences of the amino-nitrogen being satisfied through single bonds by aliphatic carbon. No. 2,143,023. Frederick M. Meigs to du Pont, both of Wilmington, Del.

Process applying and hardening coatings on articles; coating consisting of a liquid solution of phenol-formaldehyde resin and a solvent; applying to coating before it becomes insoluble a film of an agent adapted to reduce surface tension of coating, then heating. No. 2,143,618. Philip C. P. Booty and Raymond G. Booty, Chicago, Ill.

Sprayable, non-bridging, actinic, ray-resistant wood lacquer, having viscosity of less than about 100 centipoises at 25° C., and consisting of nitrostarch, resin, a plasticizer, and a solvent mixture. No. 2,143,929. Arthur H. White, Elizabeth, N. J., to Egyptian Lacquer Mfg. Co., New York City.

Paint consisting of a pigment, gums, driers, and a deodorized hydrocarbon solvent. No. 2,144,166. Waldemar Roohadze, Chicago, Ill., to Brown-Lindsay Paint Co., corp. of Ill.

Method forming an insulating coating on metallic sheet; using coating containing a binder and chromic oxide, heating coated sheet to temperature to cause reaction between binder, chromic oxide, and the underlying sheet. No. 2,144,425. Charles H. Cook, Emsworth, Pa., to Sterling Varnish Co., Haysville, Pa.

Method decorating a surface with an enamel coating of predetermined thickness. No. 2,144,666. Games Slayter, Newark, O., to Illinois Glass Co., corp. of Ohio.

Liquid coating composition comprising a film forming polymeride of a vinyl compound which forms a tough acid and alkali resistant homogeneous film without cellulose ethers of esters on evaporation of its solutions, and which forms a gel in normal butyl acetate solution, dissolved in a solution containing a liquid aliphatic ketone having an alkyl radical directly attached to the carbonyl carbon atom. No. 2,145,464. Leo V. Steck, Piedmont, and Franklin A. Bent, Berkeley, Calif., to Shell Development Co., San Francisco, Calif.

Dyes, Stains, etc.

Production water-insoluble dyestuffs, which yield yellow dyestuffs of good fastness properties, particularly of very good fastness to soaping and to light. No. 2,142,594. Arthur Zitscher, Cronberg in Taunus, Robert Schmitt, Darmstadt, and Herbert Kracker, Frankfort-am-Main, Germany, to General Aniline Works, New York City.

Production disazo dyestuffs soluble in water. No. 2,142,838. Erich Fischer and Walter Gmelin, Bad Soden in Taunus, and Richard Huss, Frankfort-am-Main-Hochst, Germany, to General Aniline Works, New York City.

Production dyestuffs of the cyanine series. No. 2,143,389. Wilhelm Schneider, Dessau, Germany, to Agfa Ansco Corp., Binghamton, N. Y.

Production sulfur dyes. No. 2,143,394. Paul Virck, Wolfen-Kreis Bitterfeld, Germany, to General Aniline Works, New York City.

Production dyestuff sulfonic acids of the dioxane series. No. 2,143,598. Heinrich Greune and Max Thiele, Frankfort-am-Main, Germany, to General Aniline Works, New York City.

Preparation vat dyestuffs of the anthraquinone series. No. 2,143,717. Hans Schlichenmaier and Ludwig Wilhelm, Berlin, Frankfort-am-Main, Germany, to General Aniline Works, New York City.

Photographic screening dye. No. 2,143,786. Leopold D. Mannes, Leopold Godowsky, Jr., and Burt H. Carroll, Rochester, N. Y., to Eastman Kodak Co., Jersey City, N. J.

Production vat dyestuffs derived from 1, 4, 5, 8-naphthalene-tetra-carboxylic acid. No. 2,143,830. Wilhelm Eckert and Otto Braunsdorf, Frankfort-am-Main-Hochst, Germany, to General Aniline Works, New York City.

Preparation pseudocyanine dyes. No. 2,143,839. Leslie G. S. Brooker, Rochester, N. Y., to Eastman Kodak Co., Jersey City, N. J.

Production soluble azo dyestuffs. No. 2,143,956. Mordecai Mendoza and George Stuart, James White, Blackley, Manchester, England, to Imperial Chemical Industries, corp. of Great Britain.

Purification ultramarine containing floatable dirt; subjecting pulp to flotation operation in presence of a flotation reagent having a selective affinity for said dirt. No. 2,144,115. Eugene Merz, Florham Park, N. J., to Calco Chemical Co., Bound Brook, N. J.

Production azo dyes. No. 2,144,219. Robert E. Etzelmiller, to du Pont, both of Wilmington, Del.

Production green vat dyestuffs. No. 2,144,365. Willy Eichholz, Mannheim, Germany, to General Aniline Works, New York City.

Manufacture azo dyes. No. 2,144,463. Swanie S. Rossander, to du Pont, both of Wilmington, Del.

Production monoazo dyestuffs. No. 2,144,556. Walter Wehrli to Chemical Works formerly Sandoz, both of Basel, Switzerland.

Production fast tints on cellulosic fibres. No. 2,144,578. Enrico Pool and Gerald Bonhote, Basel, and Carl Apotheker, Riehen, near Basel, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Manufacture mordant azo dyestuff. No. 2,144,992. Max Muller to Durand & Huguenin S. A., both of Basel, Switzerland.

Vat dye composition in solid form for use in coloring, dyeing, and textile printing. No. 2,145,193. John G. Kern, Hamburg, N. Y., to National Aniline & Chemical Co., New York City.

Preparation yellow azo pigment composition. No. 2,145,398. Joseph W. Lang, Woodstown, N. J., to du Pont, Wilmington, Del.

Explosives

Explosive including a porous, absorbent, carbonaceous material impregnated with guanidine nitrate. No. 2,142,886. Willard de C. Crater, Newark, Del., to Hercules Powder Co., Wilmington, Del.

Ammonium nitrate explosives. No. 2,145,397. William E. Kirst, Woodbury, N. J., to du Pont, Wilmington, Del.

Fine Chemicals

Production salts of beta-alkylated-choline-alkyl ethers. No. 2,142,140. Randolph T. Major, Plainfield, and Joseph K. Cline, Woodbridge, N. J., to Merck & Co., Rahway, N. J.

Production cyclopentane-polyhydro-phenanthrene derivatives, being colorless crystals, readily soluble in alcohol and chloroform, and sparingly soluble in water. No. 2,142,170. Max Bockmuhl, Gustav Ehrhart, Heinrich Ruschig, and Walter Aumuller, Frankfort-am-Main-Hochst, Germany, to Winthrop Chemical Corp., New York, N. Y.

Production iodine. No. 2,143,222. Sheldon B. Heath to Dow Chemical Co., both of Midland, Mich.

Production bromine. No. 2,143,223. Sheldon B. Heath to Dow Chemical Co., both of Midland, Mich.

Production halogen having a higher atomic weight than chlorine. No. 2,143,224. Geo. W. Hooker to Dow Chemical Co., both of Midland, Mich.

Production diphenylacetic acid esters. No. 2,143,491. Karl Miescher, Riehen, and Karl Hoffmann, Basel, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Photographic silver halide emulsion containing phenyl morpholine as an anti-foggant. No. 2,143,802. Samuel E. Sheppard and Waldemar Vanselow to Eastman Kodak Co., all of Rochester, N. Y.

Recovery iodine from charcoal. No. 2,144,119. Maurel F. Ohman, Long Beach, Cal., to Dow Chemical Co., Midland, Mich.

Method cutting Rochelle salt crystals by means of a thread moistened with a solvent of the body to be cut. No. 2,144,370. Erwin Gerlach to Telefunken Gesellschaft fur Drahtlose Telegraphie m. b. H., both of Berlin, Germany.

Preparation di-halogen substituted *d*-(p-hydroxyphenyl)-α-amino acetic acid hydrohalides of the same. No. 2,145,249. Otto Dalmer and John Niemann, Darmstadt, Germany, to Merck & Co., Rahway, N. J.

Glass and Ceramics

Non-fogging laminated window glass, having adhesively united to at least one of its exposed exterior surfaces a layer of polyvinyl alcohol. No. 2,143,482. Willy O. Herrmann, Deisenhofen, and Alfons von Putzer-Reybegg, Burghausen, Germany, to Chemische Forschungsgesellschaft m. b. H., Munich, Germany.

Manufacture splinterless glass; two sheets having interposed there between as binding agent, a product of the conjoint polymerization of vinyl chloride and another compound having the vinyl group. No. 2,144,067. Georg Kranzlein to I. G., both of Frankfort-am-Main-Hochst, Germany.

Heat absorbing, silica-calcia-alumina type glass containing ferrous iron. No. 2,144,943. Donald E. Sharp and Wm. Horak, to Bailey & Sharp Co., all of Hamburg, N. Y.

Method tempering glass articles; using liquid bath containing a molten alkali nitrate and a molten nitrate in process. No. 2,145,128. Chas. John Phillips to Corning Glass Works, both of Corning, N. Y.

Industrial Chemicals, etc.

Treatment hydrocarbons with sulfur dioxide and chlorine. No. 20,968, Reissue. Cortes F. Reed, Anoka, Minn., one-half to Charles L. Horn, Minneapolis, Minn.

Production pure dry casein which is rapidly disseminated in water forming a permanent colloidal solution, using hydrochloric acid in process. No. 2,142,093. Forest H. Clickner, to Kraft-Phenix Cheese Corp., both of Chicago, Ill.

Preparation a mono-aryloxy-acetate of a glycol mono-ether, wherein the aryloxy-acetyl group and the etherifying group are each attached to oxygen in the glycol residue. No. 2,142,126. Ernest F. Grether to Dow Chemical Co., both of Midland, Mich.

Preparation secondary alkyl monosulfonates. No. 2,142,162. James Herbert Werntz to du Pont, both of Wilmington, Del.

Cold sealing mass in form of uniform paste made from the following ingredients: asbestos meal, acetylcellulose, coloring matter, ethylacetanilide, triphenylphosphate, caoutchouc chloride, methylene chloride, and methyl alcohol. No. 2,142,193. Franzjakob Janz, Freiburg in Breisgau, Germany.

Flotation process; treating solids in liquid suspension. No. 2,142,207. John D. Price, Pueblo, Colo., to Colorado Fuel Iron Corp., corp. of Colo.

Method treating natural gas to prevent formation of gas hydrates under line pressures, including injecting ammonia into the natural gas. No. 2,142,212. Jolly T. Russell, Lawrence, Kans.

Preparation synthetic compositions useful for blending with lubricating oils; subjecting rubber, in presence of one or more other hydrocarbons, to action of anhydrous aluminum chloride. No. 2,142,220. Erich M. Steffen, Jersey City, N. J., three-fourths to Tide Water Associated Oil Co., New York City.

Production crystalline sodium silicate. No. 2,142,265. Joseph Johannes Dickmann to Naamlooze Vennootschap: Chemische Fabriek "Gembo," both of Winschoten, Netherlands.

Adhesive layer for cementing objects composed of a halogenated polyvinyl halide obtainable by treating a polymerized vinyl halide with halogen in presence of an organic solvent or swelling agent. No. 2,142,279. Adolf Menger, Krefeld-Bockum, Germany, to I. G., Frankfort-am-Main, Germany.

Preparation an activated silica gel suitable for polymerization of olefin hydrocarbons. No. 2,142,324. Paul V. McKinney, Bartlesville, Okla., to Phillips Petroleum Co., corp. of Del.

Composite cathode structure comprising a core, latter having coating comprised of an easily reducible electron producing metal compound, a reaction agent of a metal, and an inert refractory compound. No. 2,142,331. Charles H. Prescott, Jr., East Orange, N. J., to Bell Telephone Labs., New York City.

Method treating wood, by treating fibrous material produced therefrom with a solvent to extract resins and similar substances. No. 2,142,333. Thomas Robinson, Smithtown, N. Y., to Lancaster Processes, New York City.

Manufacture a porous absorbent felted sheet, comprising rag fibres, waste-paper fibres, and mechanically disintegrated wood. No. 2,142,334. Thomas Robinson, Smithtown, N. Y., to Lancaster Processes, New York City.

Method artificially coloring granules; coating same with pigment and a sodium silicate, pregelling coating in absence of carbon dioxide, then heating granules to insolubilize the silicate. No. 2,142,540. Marion H. Veazey, Rutherford, N. J., to Patent Licensing Corp., New York City.

Process for refining the dark colored kinds of colophony. No. 2,142,592. Aleksander Waligora, Szczebrzeszyn, Poland.

Production nitric acid by oxidation of ammonia. No. 2,142,646. Stanley L. Handforth, Gordon Heights, Del., and John N. Tilley, Woodbury, N. J., to du Pont, Wilmington, Del.

Purification aqueous caustic solutions by electrolysis. No. 2,142,670. William C. Eichelberger, Syracuse, N. Y., to Solvay Process Co., New York City.

Method operating a carbureted water gas set. No. 2,142,676. Reginald P. Oliveros and Louis L. Newman, Brooklyn, N. Y., to Semet-Solvay Engineering Corp., New York City.

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Lumps of coal having adhered to a transparent, dustless coating, having adhered thereon widely separated identifying flakes, large enough to be unabsorbable in the pores of the coke. No. 2,142,686. George P. Spencer, Bronxville, N. Y.

Reduction a chromium chloride to a chromium, carrying out with only dry hydrogen at a temperature of about 775° C. in a reducing zone. No. 2,142,694. Charles G. Maier, Oakland, Calif., to Great Western Electro Chemical Co., corp. of California.

Method renovating solvents composed of one or more chlorine compounds in presence of a small amount of water. No. 2,142,726. Russell A. Hetzer, to American Laundry Machinery Co., both of Cincinnati, Ohio.

Improvement of sulfite waste liquor for tanning purposes by removing carbohydrates therefrom with production of citrate. No. 2,142,739. Frederick J. Wallace, Erie, Pa., to Robeson Process Co., New York City.

Contact sulfuric acid process. No. 2,142,855. Napoleon Arthur Laury to Calco Chemical Co., both of Bound Brook, N. J.

Recovery carbon dioxide. No. 2,142,917. Gustave T. Reich, Phila., Pa.

Mixture of the sulfonyl chlorides of the aliphatic and cycloaliphatic hydrocarbons contained in a petroleum fraction composed of molecules having not less than 12 carbon atoms. No. 2,142,934. Herman A. Bruson and John W. Eastes to Rohm & Haas Co., all of Phila., Pa.

Reduction 8-chlorotheophylline to theophylline; treating the chlorinated theophylline in a slightly acid aqueous medium, the pH of which is not lower than 2, with a metal above hydrogen in the electromotive series. No. 2,142,935. Frederick Comte, Webster Groves, Mo., to Monsanto Chemical Co., St. Louis, Mo.

Stabilization of ethers; composition containing a dialkyl ether containing mono-benzyl-para-amino-phenol as a preserving agent to prevent deterioration of ether. No. 2,142,936. Ellis T. Crawford, Jr., and Rodolphus K. Turner, Charleston, W. Va., to Carbide & Carbon Chemicals Corp., New York City.

Production phosphate salts. Nos. 2,142,943-4. Friedrich P. Kerschbaum, Winter Haven, Fla., to Harold T. Stowell, Washington, D. C.

Process for activating silver surface catalysts for use in effecting the direct chemical combination of olefines with molecular oxygen to form olefine oxides. No. 2,142,948. George H. Law, South Charleston, W. Va., to Carbide & Carbon Chemicals Corp., New York City.

Manufacture soap, and removal of glycerine therefrom. No. 2,142,982. Benjamin H. Thurman, Bronxville, N. Y., to Refining, Inc., Reno, Nev.

Preparation water-resistant fibrous organic sheet material, of reduced noisiness; impregnating material with an aqueous mixture of an aliphatic alcohol of 12-20 carbon atoms and a water-soluble salt of a sulfated aliphatic alcohol of 12-20 carbon atoms, and thereafter with an aqueous emulsion of a wax in an aqueous solution of deacetylated chitin. No. 2,142,986. Luther Bishop Arnold, Jr., Fairville, Pa., to du Pont, Wilmington, Del.

Recovery of sulfur dioxide from gases. Nos. 2,142,987-8. Raymond F. Bacon, Bronxville, and Rocco Fanelli, New Rochelle, N. Y., Fanelli assignor to Bacon.

Production a polycarboxylic acid ester of an alcohol, latter being a natural acidic resin with the carboxyl thereof replaced by a carbinol group. No. 2,142,989. Harold J. Barrett, Wilmington, and Wilbur A. Lazier, Elsmere, Del., to du Pont, Wilmington, Del.

Production elemental phosphorus. No. 2,143,001. Harry A. Curtis, Knoxville, Tenn., and Raymond L. Copson, near Sheffield, Ala.

Composition for removing moisture from gaseous media comprising calcium chloride and lithium chloride in aqueous solution. No. 2,143,007. Sheldon B. Heath and Forest R. Minger to Dow Chemical Co., all of Midland, Mich.

Composition for dehumidifying gases; aqueous solution of calcium bromide and lithium bromide. No. 2,143,008. Sheldon B. Heath and Forest R. Minger to Dow Chemical Co., all of Midland, Mich.

Production olefines from saturated gaseous hydrocarbons. No. 2,143,014. Hans Klein, Mannheim, Germany, to I. G., Frankfort-am-Main, Germany.

Process which comprises reacting an olefine with an alpha chlorinated ether in presence of titanium tetrachloride. No. 2,143,021. Elmore Louis Martin to du Pont, both of Wilmington, Del.

Production felted body of fiberized mineral containing silicon dioxide, aluminum trioxide, calcium oxide, magnesium oxide, sodium oxide, boron trioxide, potassium oxide, and lead oxide. No. 2,143,022. Benjamin C. McClure, Chicago, Ill.

Reduction time of setting of a reaction mixture of concentrated phosphoric acid and a fine calcium-containing material. No. 2,143,025. Roger H. Newton, near Sheffield, Ala.

Method purifying sodium carbonate solution. No. 2,143,069. Norman C. Hill and Chas. Douglas Shannon, Saltville, Va., to Mathieson Alkali Works, New York City.

Crystalline luminescent material. No. 2,143,077. Humboldt W. Leverenz, Collingswood, N. J., to Radio Corp. of America, corp. of Del.

Manufacture an aromatic amine adapted to form a stable, water-soluble hydrochloride, by reducing the corresponding nitro compound with iron and acid. No. 2,243,152. Lee Cone Holt, Wilmington, Del., and Lee Linsley Alexander, Woodstown, N. J., to du Pont, Wilmington, Del.

Preparation condensation product of polyvinyl alcohol and acetaldehyde. No. 2,143,228. Ludwig Orthner and Willy Selle to I. G., all of Frankfort-am-Main, Germany.

Production solidified carbon dioxide and recovery of nitrogen. No. 2,143,283. Fred A. Schmidt, South Gate, Calif.

Process for continuous extraction of aluminum oxide from bauxite. No. 2,143,310. Wilhelm Fulda, Lautawerk, Lausitz, and Rudolf Wittig, Grevenbroich, Niederrhein, Germany.

Production matting baths; dissolving condensation products insoluble in water obtainable from formaldehyde and urea compounds in formic acid, and diluting solutions with water to matting baths. No. 2,143,326. Albert Landolt, Riehen, and Gustave Widmer and Hans Benz, Basel, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Method distilling difficultly distillable organic substances, of the class of fatty and rosin acids, to remove impurities therefrom. No. 2,143,344. Edw. M. Frankel and Arthur Pollak to West Virginia Pulp and Paper Co., all of New York City.

Purification crude tall oil as obtained from spent wood treating liquor to obtain therefrom pitch, abietic acid, and a distillate rich in fatty acids. No. 2,143,345. Edw. M. Frankel and Arthur Pollak to West Virginia Pulp & Paper Co., all of New York City.

Electrical purification of sulfur-containing gases. No. 2,143,365. Per Henning Wilhelm Agren, Skelleftehamn, Sweden, to Bolidens Gruvaktiebolag, Stockholm, Sweden.

Production oxygen yielding compositions. No. 2,143,367. Philipp Balz and Alfred Hloch, Bitterfeld, Germany, to I. G., Frankfort-am-Main, Germany.

Preparation 1,3-butylene-glycol; causing formaldehyde hydrate to act upon propylene under superatmospheric pressure in presence of a hydrogen halide as catalyst. No. 2,143,370. Wilhelm Fitzky to I. G., both of Frankfort-am-Main, Germany.

Production olefine oxides by catalytic oxidation. No. 2,143,371. Jacques Francon, Courbevoie, France, to Carbide & Carbon Chemicals Corp., New York City.

Production olefines from vaporized saturated hydrocarbons other than methane. No. 2,143,380. Hans Klein, Mannheim, Ferdinand Haubach, Ludwigshafen-am-Rhine, and Wilhelm Hofeditz, Mannheim, Germany, to I. G., Frankfort-am-Main, Germany.

Preparation hydroxy propanone; dehydrogenating 1,2 propylene glycol by aid of a metal dehydrogenating catalyst. No. 2,143,383. Raymond W. McNamee, So. Charleston, and Chas. M. Blair, Charleston, W. Va., to Carbide & Carbon Chemicals Corp., New York City.

Manufacture hydroxyalkylated nitrogen bases. No. 2,143,388. Paul Schlack, Berlin-Treptow, Germany, to I. G., Frankfort-am-Main, Germany.

Removal weak gaseous acids from gases, using solution comprising substance selected from the group consisting of the polymerization products of lower alkyleneamines and their N- and C- derivatives. No. 2,143,393. Heinrich Ulrich, Ludwigshafen-am-Rhine, and Hans Baehr and Wilhelm Wenzel, Leuna, Germany, to I. G., Frankfort-am-Main, Germany.

Production monocalcium chlorophosphate, free of calcium chloride, suitable for fertilizer purposes. No. 2,143,438. Edw. J. Fox, Washington, D. C., to Henry A. Wallace as Secretary of Agriculture of the U. S. and his successors.

Manufacture oxyketones of the 10,13-dimethyl cyclopentanopolyhydrophenanthrene series; by reducing the 17-keto group of a 10,13 dimethylcyclopentanopolyhydrophenanthrene-3,17-dione to the carbinol group. No. 2,143,453. Leopold Ruzicka, Zurich, and Albert Wettstein, Basel, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Condensation products of aromatic hydrocarbons with unsaturated aliphatic hydrocarbons. No. 2,143,493. Herbert Muggleton Stanley, Tadworth, Gregoire Minkoff, Epsom, and James Ernest Youell, Wallington, England.

Preparation N-p-biphenyloxamic acid, said compound being a crystalline solid having M. P. approximately 220°C. No. 2,143,520. John E. Malowan, Anniston, Ala., to Monsanto Chemical Co., St. Louis, Mo.

Method accelerating hydrolysis of a titanium salt solution; by heating a hydrolizable titanium salt solution having mixed therewith a composite silica-titanium-dioxide gel. No. 2,143,530. Benj. Wilson Allan, Balto., Md.

Treatment beet sugar juices, using lime in process. No. 2,143,594. Earl B. Cowan, Grand Forks, N. D.

Synthesis base exchange materials. No. 2,143,670. Claude B. Young, Columbus, O.

Process hydrogenating amides, by treatment with hydrogen at hydrogenating temperatures and pressures in presence of, as catalyst, an oxide of a hydrogenating metal. No. 2,143,751. Homer Adkins, Madison, Wis., to Rohm & Haas Co., Phila., Pa.

Preparation tertiary alkylaryloxy alkyl sulfates. No. 2,143,759. Herman A. Bruson, Phila., Pa., and Otto Stein, Frankfort-am-Main, Germany, to Rohm & Haas Co., Phila., Pa.

Treatment dolomite for producing magnesia alba and lime products. No. 2,143,774. Chas. Hart, Chester, Pa.

Process for bleaching raw stock cotton, boiling same in a caustic soda solution, then subjecting to bath including soda ash, sodium stearate, sodium hypochlorite, and a buffer. No. 2,143,803. Edwin P. Sherman, High Point, N. C., to Geo. E. Sherman Co., Brooklyn, N. Y.

Process for bleaching fibrous cellulose material containing fast-dyed figures. No. 2,143,804. Edwin P. Sherman, High Point, N. C., to Geo. E. Sherman Co., Brooklyn, N. Y.

Preparation 2,4-dithiohydantoin. No. 2,143,816. Ralph A. Jacobson to du Pont, both of Wilmington, Del.

Recovery hydrocyanic acid from gases that also contain hydrogen sulfide. No. 2,143,821. Frederick W. Sperr, Jr., Vineland, N. J., to Rohm & Haas Co., Phila., Pa.

Production anhydride of methacrylic acid; reacting thionyl chloride with a salt of methacrylic acid. No. 2,143,924. Leon Rubenstein, Saltcoats, Scotland, to Imperial Chemical Industries, corp. of Great Britain.

Process in which a compound of the group consisting of acrylic acid and methacrylic acid and their esters is subjected to heat; inhibiting the polymerization during heating, of the compound, by presence of an anhydrous metal halide. No. 2,143,941. John William Croom Crawford, Norton-on-Tees, England, to Imperial Chemical Industries, corp. of Great Britain.

Manufacture stable aqueous emulsions. No. 2,143,986. Walter Kling and Ernst Gotte to H. Th. Bohme Aktiengesellschaft, both of Chemnitz, Germany.

Treatment water containing oxidizable metallic salts having ferrous and manganous ions, using chlorine in process. No. 2,144,051. Clarence J. Frankfurter, Lincoln, Neb.

Preparation aromatic amines. No. 2,144,220. Robt. E. Etzelmiller to du Pont, both of Wilmington, Del.

Manufacture sheet of fibrous material having zinc resinate and arsenious oxide distributed throughout its mass. No. 2,144,271. Robert G. Quinn, Glens Falls, N. Y., to International Paper Co., New York City.

Condensation product of a triglyceride of an aliphatic carboxylic acid, containing at least 10 carbon atoms in the molecule, with another compound. No. 2,144,324. Albert Frank Bowles, Jersey City, and Saul Kaplan, Teaneck, N. J., to Richards Chemical Works, Inc., Jersey City, N. J.

Treatment mixture of sodium chloride and hygroscopic impurities for removal of the latter from the sodium chloride. No. 2,144,328. Luis Bartolome Carrizo, Quilino, Argentina.

Process and apparatus for production of adiponitrile. No. 2,144,340. Wilbur A. Lazier, New Castle County, Del., to du Pont, Wilmington, Del.

Production hydrogen peroxide by oxidation of an organic hydrazo compound, dissolved in an organic solvent, in which the hydrazo compound and the resulting azo compound are soluble, but in which the hydrogen peroxide formed is insoluble. No. 2,144,341. John C. Michalek and Edward C. Soule, Niagara Falls, N. Y., to Mathieson Alkali Works, New York City.

Dehydration of alkali metal hydroxides; reacting an alcoholate derived from the same alkali metal and an alcohol having not more than 4 carbon atoms with the aqueous component of the alkali metal hydroxide, and removing alcohol formed by distillation. No. 2,144,364. George Lewis Cunningham, Niagara Falls, N. Y., to Mathieson Alkali Works, New York City.

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Sewage treatment apparatus. Nos. 2,144,385-6. Carl H. Nordell to Advance Engineering Co., both of Chicago, Ill.

Method treating charging oil for a destructive hydrogenating process, to remove objectionable solid material unsusceptible to destructive hydrogenation, using hydrocarbon solvent in process. No. 2,144,409. Mathias Pier and August Eisenhut, Heidelberg, Germany, to Standard I. G. Co., Linden, N. J.

Preparation quinone, by treating aniline sulfate with a manganese dioxide ore containing about 2% iron (calculated as Fe_2O_3) and sulfuric acid. No. 2,144,424. Alwin C. Carus, La Salle, Ill., to Carus Chemical Co., corp. of Ill.

Purification of benzoquinone. No. 2,144,433. Joseph C. Schumacher, La Salle, Ill., to Carus Chemical Co., corp. of Ill.

Process of concentration; agitating a pulp of an ore containing barite and siliceous constituents in presence of bone oil and an acid capable of forming with water a distinctly acid solution readily titratable with an aqueous solution of a base, in final step collecting the concentrate. No. 2,144,442. Francis X. Tartaron, Mulberry, Fla., to Phosphate Recovery Corp., New York City.

Production keto carboxylic acid esters. No. 2,144,455. Ivan Gubelmann, to du Pont, both of Wilmington, Del.

Production color films by the subtractive three-color method. No. 2,144,457. Ludwig Horst, Berlin-Halensee, Germany.

Manufacture keto carboxylic acids derived from terpene-maleic anhydride addition products. No. 2,144,464. John Harrison Sachs, to du Pont, both of Wilmington, Del.

Treatment mixture of gases containing reducing agents and a small percentage of oxygen, to free gas of oxygen. No. 2,144,497. Rolland R. La Pelle, Wilkinsburg, Pa., to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Preparation glycerol dichlorohydrin from hydrogen chloride and glycerol; carrying out reaction in presence of an inert, water-immiscible organic solvent. No. 2,144,612. Edgar C. Britton and Roy Lyman Heindel to Dow Chemical Co., all of Midland, Mich.

Method increasing solubility of metal salts of beta carboxy compounds in motor fuels. No. 2,144,654. Walter S. Guthmann and Herman Kerst, Jr., to Leo Corp., all of Chicago, Ill.

Separation gaseous mixtures. No. 2,144,692. Paul Schuftan, Hollriegelskreuth, near Munich, Germany, to Linde Air Products Co., corp. of Ohio.

Production lumpy, water-resistant bodies consisting of magnesium oxide and calcium compounds. No. 2,144,740. Arthur Pollak, Kaznejov, Czechoslovakia.

Continuous production polymerization products of acetylene. No. 2,145,058. Robt. Stadler, Heidelberg, and Karl Haberl, Ludwigshafen-am-Rhine, Germany, to I. G., Frankfort-am-Main, Germany.

Production butadiene; treating vinylacetylene with amalgams of alkali metals in presence of substances which develop hydrogen with the amalgams. No. 2,145,059. Robt. Stadler, Heidelberg, Karl Ackermann, Mannheim, and Erwin Lehrer, Ludwigshafen-am-Rhine, Germany, to I. G. Frankfort-am-Main, Germany.

Condensation alcohols. No. 2,145,097. Norman D. Scott, Niagara Falls, N. Y., to du Pont, Wilmington, Del.

Refining hydrocarbon oils by means of esters. No. 2,145,185. Ernest Terres, New York City, and Erich Saegebarth, Long Island City, N. Y., and Josef Moos, Berlin-Mariendorf, Germany, to Edelneau Gesellschaft m. b. H., Berlin, Germany.

Cyclic method producing gypsum from phosphate rock. No. 20,994. Reissue. Markus Larsson, Berlin, Germany, to Kunstdunger-Patent-Verwertungs-Aktiengesellschaft, Glarus, Switzerland.

Manufacture aliphatic polyureas. No. 2,145,242. Harold Wilfred Arnold to du Pont, both of Wilmington, Del.

Manufacture coated metal article, using lubricant containing mixture of ordinary alcohol, water, and glycerine. No. 2,145,252. Loy S. Engle, Jackson Heights, L. I., N. Y., to Interchemical Corp., corp. of O.

Process for deodorizing spent sulfuric acid. No. 2,145,316. Gustave T. Reich, Phila., Pa.

Manufacture soluble metallic fluorides, particularly of beryllium fluoride. No. 2,145,329. Carlo Adamoli, Milan, Italy, to Perosa Corp., Wilmington, Del.

Production carboxymethyl ether of a polyvinyl alcohol; etherifying a polyvinyl alcohol with chloroacetic acid. No. 2,145,345. Henry Dreyfus, London, England.

Preparation sulfonic acids of high cleansing, wetting and emulsifying power. No. 2,145,369. Arthur L. Osterhof, Newark, Del., to Hercules Powder Co., Wilmington, Del.

Process hydrogenating monovinylacetylene. No. 2,145,387. Walter Berndt, Frankfort-am-Main-Hochst, and Otto Wulff, Konigstein in Taunus, Germany, to I. G., Frankfort-am-Main, Germany.

Preparation diacetyl from methyl vinyl ketone; oxidizing the latter by means of mercuric salts. No. 2,145,388. Albert Smith Carter, to du Pont, both of Wilmington, Del.

Production molded, calendered articles; using composition including a rubber hydrochloride, a non-thermoplastic filler, chlorinated paraffin and a chlorinated diphenyl. No. 2,145,390. Erich Gebauer-Fuelnegg, deceased, late of Gary, Ind., by Marie Gebauer-Fuelnegg, administratrix, Evanston, Ill., and Floyd E. Williams, Gary, Ind., to Marbon Corp., Chicago, Ill.

Preparation biuret; heating urea at temperature of 130-205°C. and pressure of not greater than 200 mm. of mercury to form mixture containing urea and biuret, then separating biuret. No. 2,145,392. Jesse Harmon to du Pont, both of Wilmington, Del.

Manufacture stable nitrite salt composition; flash drying a solution of sodium chloride containing a nitrite of alkali metal and a buffer agent. No. 2,145,417. Lloyd A. Hall, to Griffin Labs., both of Chicago, Ill.

Preparation halogen-carboxylic acid esters. No. 2,145,443. Benjamin R. Harris, Chicago, Ill.

Conversion gaseous hydrocarbons to liquid products. No. 2,145,576. Harold V. Atwell, White Plains, N. Y., to Process Management Co., New York City.

Preparation heterocyclic azo derivatives. No. 2,145,579. Arthur Binz, Berlin-Wilmersdorf, and Otto von Schickh, Berlin, Germany, to Schering-Kahlbaum A. G., Berlin, Germany.

Production arylides of acylacetic acids; bringing about reaction between an ester of acylacetic acid and an aromatic amine, having a reactive hydrogen atom in the amino group, in presence of an alkylol amine. No. 2,145,617. Frederic H. Adams, Somerville, N. J., to Calco Chemical Co., Somerset, N. J.

Transformation of soluble mixtures containing chlorinated rubber into insoluble products. No. 2,145,639. Wilhelm Zander to Deutsche Gold und Silber Scheideanstalts, vormals Roessler, both of Frankfort-am-Main, Germany.

Electric contact composed of contact material characterized by addition of cadmium oxide. No. 2,145,690. Franz R. Hensel to P. R. Mallory & Co., both of Indianapolis, Ind.

Preparation of definite crystalline hydrates of sodium sesquisilicate from silicate solutions containing more water and less Na_2O than is required to produce the final hydrate product. No. 2,145,749. Chester L. Baker, Berkeley, Calif., to Philadelphia Quartz Co., Phila., Pa.

Metallic blast material. No. 2,145,756. John F. Ervin, Ann Arbor, Mich.

Preparation higher fatty aldehydes; first passing gaseous formaldehyde into contact with a body of a soap of a fatty acid having at least 6 carbon atoms. No. 2,145,801. Anderson W. Ralston and Robert J. Vander Wal to Armour and Co., all of Chicago, Ill.

Processes of separating nitrile-hydrocarbon mixtures by means of carboxylic acids. No. 2,145,802. Anderson W. Ralston and William O. Pool, to Armour and Co., all of Chicago, Ill.

Processes of separating nitrile-hydrocarbon mixtures by means of amines. No. 2,145,803. Anderson W. Ralston and William O. Pool, to Armour and Co., all of Chicago, Ill.

Processes of separating nitrile-hydrocarbon mixtures by means of phenol. No. 2,145,804. Anderson W. Ralston and William O. Pool, to Armour and Co., all of Chicago, Ill.

Preparation zinc salt solutions of zinc aminochloride of high purity having composition $Zn(NH_3)_4Cl_2$. No. 2,145,817. Buren L. Stoops, Kennett Square, Pa., to Hercules Powder Co., Wilmington, Del.

Leather

Preparation dry chrome tanned leather, having wetting back properties, whereby subsequent processing in aqueous media, such as dyeing, may be readily effected. No. 2,144,647. John Burchill, Henry Alfred Piggott, and Geo. Stuart James White, Blackley, Manchester, England, to Imperial Chemical Industries, London, England.

Metals, Alloys, Ores

Method refining cathode copper. No. 2,142,090. Leon Bercovici, Brussels, Belgium, to Societe Generale Metallurgique de Hoboken, Hoboken, near Antwerp, Belgium.

Production sponge iron. No. 2,142,100. Julian M. Avery, Greenwich, Conn., to Arthur D. Little, Inc., Cambridge, Mass.

Manufacture lead from chlorinated roasted and lixiviated lead-containing roasted pyrites, using sodium chloride and calcium chloride containing aqueous solutions in process. No. 2,142,274. Ernst Kuss, one-half to Duisburger Kupferhutte, both of Duisburg, Germany, and one-half to I. G., Frankfort-am-Main, Germany.

Manufacture cold rolled silicon steel strip having a silicon content of about 3.5%, a maximum permeability of 13,000 and a watt loss value per pound of about .51 at 10,000 B and 60 cycles. No. 2,142,347. Vere B. Browne, Brackenridge, and William E. Caugherty, Natrona, Pa., to Allegheny Ludlum Steel Corp., corp. of Pa.

Electrodeposition on aluminum and aluminum alloys. No. 2,142,564. Joachim Kurpiun, Berlin-Grunewald, Germany, to Schering-Kahlbaum A. G., Berlin, Germany.

Electrical contacting element composed of an alloy containing cobalt, phosphorus, beryllium, and copper. No. 2,142,671. Franz R. Hensel and Earl I. Larsen to P. R. Mallory & Co., all of Indianapolis, Ind.

Electrical contacting element composed of an alloy containing cobalt, phosphorus, silicon, and copper. No. 2,142,672. Franz R. Hensel and Earl I. Larsen to P. R. Mallory & Co., all of Indianapolis, Ind.

Welding rods composed of cadmium, nickel and/or cobalt silicide, and phosphorus. No. 2,142,673. Franz R. Hensel and Earl I. Larsen to P. R. Mallory & Co., all of Indianapolis, Ind.

Alloy steel for internal combustion valves or valve elements. No. 2,142,781. Harry L. Frevert and Francis B. Foley to Midvale Co., all of Phila., Pa.

Alloy composed of calcium, magnesium, cadmium, and lead. No. 2,142,835. Jesse O. Betterton and Albert A. Smith, Jr., Metuchen, and Albert J. Phillips, Plainfield, N. J., to American Smelting & Refining Co., New York City.

Alloy composed of calcium, lead, and magnesium. No. 2,142,836. Jesse O. Betterton and Albert A. Smith, Jr., Metuchen, and Albert J. Phillips, Plainfield, N. J., to American Smelting & Refining Co., New York City.

Treatment nickel-chromium alloys. No. 2,142,869. Hugh John Fraser, Larchmont, N. Y., and William George Drugan and James Orin McDowell, Huntington, W. Va., to International Nickel Co., New York City.

Process for extracting ores, and the like. No. 2,142,926. Adriaan Cornelis van Es, Huizen, Netherlands, one-half to N. V. Maatschappij voor Zwavelzuurbereiding Voorheen G. T. Ketjen & Co., Amsterdam, Netherlands.

Impregnation of metals with silicon. No. 2,142,941. Harry K. Ihrig to Globe Steel Tubes Co., both of Milwaukee, Wisc.

Method converting a dense crystalline zirconium oxide into a granular homogeneous zirconium carboxide free from zirconium oxide. No. 2,143,-013. Chas. J. Kinzie and Donald S. Hake, Niagara Falls, N. Y., to Titanium Alloy Mfg. Co., New York City.

Heat-enduring ferrous alloy casting. No. 2,143,090. Bertram J. Sayles, Pittsburgh, Pa.

Process for reducing grain in noble metals and their alloys, by incorporating metals of the group iridium, rhodium, and ruthenium in the shape of pre-alloys with non-noble metals. No. 2,143,217. Wilhelm Truthe to Deutsche Gold und Silber Scheideanstalt vormals Roessler, both of Frankfort-am-Main, Germany.

Hot workable, hardenable aluminum base alloy capable of taking a very fine finish and which is, at the same time, free cutting, composed of copper, antimony, magnesium and aluminum. No. 2,143,595. James Herbert Dickin to British Aluminium Co., both of London, England.

Production ferro-aluminum-zirconium alloys. No. 2,143,686. Geo. F. Comstock, Niagara Falls, N. Y., to Titanium Alloy Mfg. Co., New York City.

Method and composition for cadmium plating. No. 2,143,760. Leroy Camel, Maple Heights, O., to Plating & Galvanizing Co., Cleveland, O.

Method and composition for bright coating of zinc. No. 2,143,761. Leroy Camel, Maple Heights, O., to Plating & Galvanizing Co., Cleveland, O.

Treatment electrolytically deposited nickel cathodes to make them more readily soluble when used as anodes in the nickel plating art. No. 2,143,913. Anton Martin Gronningsaeter, Crestwood, N. Y., to Falconbridge Nickel Mines, Ltd., Toronto, Ont., Canada.

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Alloy containing beryllium, silver, nickel, and copper. No. 2,143,914. Franz R. Hensel and Earl I. Larsen to P. R. Mallory & Co., all of Indianapolis, Ind.

Fused coating of solid metal for wrappings and other purposes. No. 2,143,948. Heinrich Karl, Jersey City, N. J.

Method forming films of amalgam on the surface of alloy particles for amalgams; immersing particles in solution containing a soluble double cyanide of mercury. No. 2,143,959. Karl Schumpelt, Union, and Edward O. Liebig, Arlington, N. J., to Baker & Co., corp. of New Jersey.

Production colloid relief on a nickel surface. No. 2,143,995. Charles Edmund Meulendyke, Rochester, N. Y.

Low metalloid, iron-manganese-copper alloy, characterized by its susceptibility to case hardening to provide an extremely hard surface confining a soft ductile core. No. 2,144,001. Raymond S. Simmons to Keystone Steel & Wire Co., both of Peoria, Ill.

Manufacture silicon-iron alloys. No. 2,144,200. Wilhelm Rohn and Werner Hessenbruch to Heraeus-Vacuum-schmelze A. G., all of Hanau, Germany.

Thermionic cathode for use in an electron discharge device, consisting of molybdenum, another metal, and having an electrolytically deposited coating of chromium. No. 2,144,250. Victor O. Allen, Madison, and Joseph Johnson, Newark, N. J., to Radio Corp. of America, New York City.

Thermionic cathode adapted for use as an electron emitter in electron discharge devices, comprising metal body consisting of tungsten, thoria and electrolytically applied chromium. No. 2,144,249. Victor O. Allen, Madison, N. J., to Radio Corp. of America, New York City.

Alloy composed of nickel, manganese, iron, phosphorus, aluminum, tin, magnesium, silver, and copper. No. 2,144,279. Henry L. Whitman, Los Angeles, Calif.

Recovery metallic magnesium, involving dehydration of magnesium chloride in an atmosphere of anhydrous hydrochloric gas, to obtain anhydrous magnesium chloride, and subsequent electrolysis of fused anhydrous magnesium chloride to form metallic magnesium and a gaseous product containing chlorine. No. 2,144,339. Frederick Laist to Anaconda Copper Mining Co., both of New York City.

Method electrolytically coating a ferrous sheet with a thin coating of zinc. No. 2,144,643. Robt. R. Tanner to Patents Corp., both of Detroit, Mich.

Stain-resisting iron-base alloy having deep drawing properties. No. 2,144,713. Frederick M. Becket to Union Carbide & Carbon Corp., both of New York City.

Metal coating for use directly on ferrous metal; comprising an amalgam of mercury and a low melting point metal, copper sulfate, corrosive sublimate, and zinc chloride thoroughly mixed with the amalgam. No. 2,144,798. Newell M. Epperson to Taywal Corp., both of Chattanooga, Tenn.

Production metallic zinc from mixture of oxidic compounds of zinc and iron. No. 2,144,914. Carl Paul Debuch, Frankfort-am-Main, Germany, to American Lurgi Corp., New York City.

Recovery silver from argento-jarosite by solution methods. No. 2,144,932. Robert R. Porter, Old Greenwich, Conn., to American Cyanamid Co., New York City.

Metallurgy of zinc. No. 2,144,942. Wm. Seguine, Jr., Del Ray Beach, Fla.

Corrosion resistant alloy, mechanically workable in the cold, made from copper, cobalt and nickel, manganese, iron, and zinc. No. 2,144,993. Wolf Johannes Muller and Moritz Niessner, to Oesterreichische Dynamit Nobel Aktiengesellschaft, all of Vienna, Austria.

Manufacture nickel-chromium alloys. No. 2,145,020. Frederick M. Becket, New York City, and Russell Franks, Niagara Falls, N. Y., to Electro Metallurgical Co., corp. of W. Va.

Production drawn brass bearing alloys. No. 2,145,065. Eugen Vaders, Frankfort-am-Main, Germany, to Vereinigte Deutsche Metallwerke Aktiengesellschaft, Frankfort-am-Main-Heddernheim, Germany.

Method floating carbonaceous precious metal ores; subjecting metal ore to froth flotation in presence of a dextrine. No. 2,145,206. Robt. B. Booth, Springdale, Conn., to American Cyanamid Co., New York City.

Recovery tin and other oxidizable metals from materials containing same. No. 2,145,433. Hartmut W. Richter, Rahway, N. J.

Production lead alloy containing also tellurium, copper and iron. No. 2,145,513. Brinley Jones and Clifford Wilson, Perivale, England, to Goodlass Wall & Lead Industries, Ltd., London, England.

Method brightening nickel surfaces on objects having a nickel coating. No. 2,145,518. Efraim Emanual Lindh, Kallinge, Sweden, to Elektrokemiska, Aktiebolaget, Bohus, Sweden.

Steel welding rod for gas welding; composed of silicon, sulfur, and iron. No. 2,145,604. Arthur R. Lytle, Niagara Falls, N. Y., to Oxweld Acetylene Co., a corp. of W. Va.

Fireproof, bronze welded structure comprising two steel members bonded with weld filler material containing nickel, silicon, zinc, and copper. No. 2,145,625. Augustus B. Kinzel, Douglaston, N. Y., to Electro Metallurgical Co., corp. of W. Va.

Anode for use in electrodeposition of tungsten alloys. No. 2,145,746. Harry Howard Armstrong and Arthur Burley Menefee, Beverly Hills, Calif., to Tungsten Electrodeposit Corp., Washington, D. C.

Electric contacting element composed of cobalt, cadmium, and copper. No. 2,145,792. Franz R. Hensel and Earl I. Larsen to P. R. Mallory & Co., all of Indianapolis, Ind.

Preservation surface of ferrous metallic articles during and subsequent to fabrication into final form; maintaining thereon a film comprising a halogenated saturated hydrocarbon having B. P. above 100°C. No. 2,145,827. Allan E. Chester, Shaker Heights, O., to Ferro Enamel Corp., Cleveland, O.

Naval Stores

Treatment abietyl compounds and products produced thereby. No. 2,143,989. Edwin R. Littman, to Hercules Powder Co., both of Wilmington, Del.

Method refining rosin; removing color bodies therefrom with solution of sulfur dioxide in an organic solvent. No. 2,145,335. Jos. N. Borglin to Hercules Powder Co., both of Wilmington, Del.

Paper and Pulp

Process and system for treating wastepaper stock. No. 2,142,823. Arno W. Nickerson, White Plains, N. Y., and Emil C. Gildenzopf, York, Pa.

Method sizing photographic paper. No. 2,143,809. John C. Trahey to Eastman Kodak Co., both of Rochester, N. Y.

Treatment wood pulp to remove pitch; using a water-immiscible organic solvent and an emulsifying agent in process. No. 2,144,756. James H. Fritz, Belleville, N. J., to National Oil Products Co., Harrison, N. J.

Manufacture cigarette paper from paper pulp; incorporating stearic acid and titanium dioxide in pulp. No. 2,145,151. Roger Braunstein to Societe Anonyme des Anciens Etablissements Braunstein Freres, both of Paris, France.

Petroleum

Simultaneously dewaxing and acid treating mineral oil of an A. P. I. gravity of at least 35°. No. 2,142,359. Erwin R. Lederer and George M. Pfau, Fort Worth, Tex., assignors to said Lederer.

Solvent refining of oils to lower their viscosity gravity constant. No. 2,142,525. Henry D. Noll, Beaumont, Tex., to Socony-Vacuum Oil Company, New York City.

Selective pyrolytic conversion of low-boiling and high-boiling hydrocarbon oils. No. 2,142,675. Edwin F. Nelson to Universal Oil Products Co., both of Chicago, Ill.

Production higher boiling hydrocarbons from olefines. No. 2,142,937. Richard M. Deanesly and Evan Clifford Williams, Berkeley, and Leo V. Steck, Piedmont, Calif., to Shell Development Co., San Francisco, Calif.

Method solvent refining lubricant oil by means of a selective solvent comprising pyridine. No. 2,142,939. Alfred W. Francis, Woodbury, N. J., to Socony-Vacuum Oil Co., New York City.

Polymerization of gaseous hydrocarbons. No. 2,142,969. LeRoy G. Story, White Plains, N. Y., to Texas Co., New York City.

Production high molecular weight polar compounds. No. 2,142,980. Hendrik Willem Huijser and Christiaan Nicolaas Jacobus de Nooijer, Amsterdam, Netherlands, to Shell Development Co., San Francisco, Calif.

Converting and otherwise rendering ineffective the gum and color forming constituents present in the tar-free light oil produced by the catalytic hydrogenation of the pyrolyzed products of natural gas. No. 2,143,036. Harold M. Smith, Peter Grandone, and Harry T. Rall, Bartlesville, Okla.

Manufacture light hydrocarbons. No. 2,143,050. Henry G. Berger, Woodbury, N. J., to Socony-Vacuum Oil Co., New York City.

Catalytic desulfurization of petroleum. No. 2,143,078. Arthur L. Lyman, Howard B. Nichols, and Robert C. Mithoff, Berkeley, Calif., to Standard Oil Co. of Calif., San Francisco, Calif.

Method continuously resolving a petroleum emulsion containing mud and solid wax. No. 2,143,190. Gerald M. Fisher, Los Angeles, and Murray E. Garrison, Huntington Park, Calif., to Socony-Vacuum Oil Co., New York City.

Separation weakly acid-reacting, volatile, malodorous organic sulfur compounds from the hydrogen sulfide with which they are associated in admixture with hydrocarbon gases. No. 2,143,286. Wm. H. Shiffler and Melvin M. Holm, Berkeley, Calif., to Standard Oil Co., San Francisco, Calif.

Process for effecting catalytic reactions. No. 2,143,?64. Marion D. Taylor, Berkeley, Calif., to Shell Development Co., San Francisco, Calif.

Purification mercaptan oils. No. 2,143,405. Jos. A. Campbell, Jr., Manhattan Beach, and Theodore Merle Phillips, Lomita, Calif., to Union Oil Co. of Calif., Los Angeles, Calif.

Solvent refining of petroleum containing polar and non-polar hydrocarbon groups; separating said groups by extracting the petroleum with ortho-methoxybenzonitrile. No. 2,143,415. Arthur W. Hixson, Leonia, N. J., and Ralph Miller, New York City, to Chemical Foundation, New York City.

Treatment a hydrocarbon distillate containing naphthenes and paraffins. No. 2,143,472. Arthur Hallam Boultbee, Martinez, Calif., to Shell Development Co., San Francisco, Calif.

Production an aliphatic tertiary alcohol of at least 5 carbon atoms per molecule from the corresponding olefine by absorption in aqueous mineral acid solution. No. 2,143,478. Wm. Engs and Alasdair W. Fairbairn, Oakland, Calif., to Shell Development Co., San Francisco, Calif.

Production ketene and isobutylene; by contacting mesityl oxide at temperature between 200 and 500°C. with a calcined mixture comprising a phosphoric acid and a solid absorbent. No. 2,143,489. Sumner H. McAllister, Lafayette, and Wm. A. Bailey, Jr., Berkeley, Calif., to Shell Development Co., San Francisco, Calif.

Manufacture highly sulfurized oil, in which the sulfur is chemically combined in the hydrocarbon compounds comprising the oil. No. 2,143,512. Alfred Putnam Frame, Haddonfield, N. J., to Cities Service Oil Co., New York City.

Treatment petroleum oil, which normally upon treatment with sulfuric acid gives rise to a peppery, not readily separable sludge, with nonfuming sulfuric acid. No. 2,143,531. Alvin P. Anderson, Alton, Ill., to Shell Development Co., San Francisco, Calif.

Production synthetic lubricating oil of high viscosity index by polymerization of low boiling olefines comprising 3 to 6 carbon olefines. No. 2,143,566. Franz Rudolf Moser, Amsterdam, Netherlands, to Shell Development Co., San Francisco, Calif.

Polyfurcous fuel; motor fuel composed of mixture of light hydrocarbons and an acetal which has at least one bifurcous terminal. No. 2,143,870. Carleton Ellis, Montclair, N. J., to Standard Oil Development Co., corp. of Del.

Method refining an asphalt-free lubricating oil stock, using propane in process. No. 2,143,882. Percy C. Keith, Jr., Peapack, N. J., Robert E. Wilson, Chicago, Ill., and Myran J. Livingston, Mariners Harbor, S. I., N. Y., to Standard Oil Co., Chicago, Ill.

Process refining petroleum oils. No. 2,143,890. Leo Liberthson, New York City, to L. Sonneborn Sons, corp. of Del.

Conversion hydrocarbon oils. No. 2,143,894. Jacque C. Morrell to Universal Oil Products Co., both of Chicago, Ill.

Manufacture an artificial leather, first impregnating a thin paper with latex adhesive. No. 2,143,911. Charles A. Fourness, Appleton, Wisc., to Paper Patents Co., Neenah, Wisc.

Method cracking oils in the vapor phase. No. 2,143,917. Percy C. Keith, Jr., Peapack, N. J., to Gasoline Products Co., Newark, N. J.

Conversion higher-boiling hydrocarbons into lower-boiling hydrocarbons. No. 2,143,949. Percival C. Keith, Jr., Peapack, N. J., to Process Management Co., New York City.

Method differentially shutting off water in oil wells, penetrating both oil and water producing formations without permanently hindering flow of oil into the well; using two aqueous solutions in process. No. 2,143,990. Albert G. Loomis, Mount Lebanon Township, Allegheny County, Pa., to Gult Research & Development Co., Pittsburgh, Pa.

Method shutting off water in brine-bearing formations in adjacent oil wells; injecting into the formations in liquid form a water-soluble soap of the polycyclic naphthenate type, finally forming an insoluble sealing deposit in the brine-bearing formations. No. 2,143,991. Albert G. Loomis to Gulf Research & Development Co., both of Pittsburgh, Pa.

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Method processing hydrocarbon oil to convert higher-boiling hydrocarbons into lower-boiling hydrocarbons suitable for motor fuel. No. 2,144,245. Warren K. Lewis, Newton, Mass., to Standard Oil Development Co., corp. of Del.

Treatment hydrocarbon products containing gasoline and furnace oil components, to remove objectionable unsaturates therefrom. No. 2,144,276. Herbert M. Steininger, Kansas City, Mo., to Standard Oil Co., corp. of Ind.

Process cracking heavy hydrocarbon oils. No. 2,144,488. Louis D. Forward, New York City, to Forward Process Co., Dover, Del.

Catalytic hydration olefines. No. 2,144,750. Franklin A. Bent, Berkeley, Calif., to Shell Development Co., San Francisco, Calif.

Conversion hydrocarbon oils. No. 2,144,803. Lyman C. Huff to Universal Oil Products Co., both of Chicago, Ill.

Manufacture alkyl halides; additively reacting a halogen acid with a mono-olefin in presence of an acid of phosphorous. No. 2,144,816. Raymond E. Schaad to Universal Oil Products Co., both of Chicago, Ill.

Conversion hydrocarbon oils. No. 2,144,819. Kenneth Swartwood to Universal Oil Products Co., both of Chicago, Ill.

Conversion hydrocarbon oils to produce motor fuel therefrom. No. 2,144,826. Chas. H. Angell to Universal Oil Products Co., both of Chicago, Ill.

Process breaking viscosity of an oil containing sufficient metal naphthenate in solution to increase viscosity and stringiness. No. 2,144,855. John T. Rutherford and Henry A. Francis, Berkeley, Calif., to Standard Oil Co. of Calif., San Francisco, Calif.

Gasoline manufacture with by-product recovery. No. 2,145,025. Robt. M. Isham, Okmulgee, Okla., and Henry N. Lyons, Maplewood, N. J., to Power Patents Co., Jersey City, N. J.

Soluble oil comprising mineral oil, an alkali metal naphthenate, and an oil-soluble triethanolamine soap. No. 2,145,239. Marcellus T. Flaxman, Wilmington, Calif., to Union Oil Co. of Calif., Los Angeles, Calif.

Production aralkenyl compounds and polymerization products thereof. No. 2,145,501. Hein Israel Waterman and Willem Johannes Cornelis de Kok, Delft, Netherlands, to Shell Development Co., San Francisco, Calif.

Hydrogenation of hydrocarbon oils. No. 2,145,657. Vladimir Ipatieff and Vasili Komarewsky to Universal Oil Products Co., both of Chicago, Ill.

Solvent refining of mineral oil. No. 2,145,829. Louis A. Clarke, Fishkill, and Edwin C. Knowles, Beacon, N. Y., to Texas Co., New York City.

Pigments, Dry Colors

Recovery carbon black from the hot gaseous residue of a continuous fluid hydrocarbon cracking and carbon black producing reaction. No. 2,143,770. George F. Friauf and Frank M. Perry, Pampa, Tex., to General Atlas Carbon Co., Dover, Del.

Method hydrolyzing titanium salt solutions; adding to solution a gel of titanium oxide, and heating solution to effect hydrolysis. No. 2,143,850. Benjamin Wilson Allan, Baltimore, Md.

Method hydrolytically precipitating titanium hydrate from a hydrolizable titanium salt solution; adding to salt solution at its boiling point an alkaline compound in the dry form, and heating to effect hydrolysis. No. 2,143,851. Benjamin Wilson Allan to American Zirconium Corp., both of Baltimore, Md.

Manufacture zinc carbonate and zinc oxide. No. 2,144,299. Royal L. Sessions, Los Angeles, and Thomas A. Mitchell, Torrance, Calif., to Hughes-Mitchell Processes, Inc., Denver, Colo.

Manufacture improved white titanium dioxide pigments; precipitating on such a pigment a metallic fluoride which is difficultly soluble in water. No. 2,144,577. Karl Walter Petersen, Krefeld-Uerdingen, Germany, to I. G., Frankfort-am-Main, Germany.

Bronze or metallic paste pigments. No. 2,144,953. Othon Adolf Ziehl, Union, N. J., to Metals Disintegrating Co., Elizabeth, N. J.

Manufacture carbon black. No. 2,144,971. Geo. L. Heller and Carl W. Snow, Pampa, Tex., to General Atlas Carbon Co., Dover, Del.

Manufacture satin white pigment; treating finely divided clay with sulfuric acid producing solution containing aluminum sulfate together with coloring impurities and an insoluble clay residue, removing coloring ingredients, and reacting purified solution with hydrated lime. No. 2,145,149. Lincoln T. Work, New York City.

Production zinc sulfide pigment. No. 2,145,815. Donald G. Morrow, to Hercules Powder Co., both of Wilmington, Del.

Purification zinc salt solutions. No. 2,145,816. Buren I. Stoops, Kennett Square, Pa., to Hercules Powder Co., Wilmington, Del.

Resins, Plastics, etc.

Plastic composition made from a cellulose derivative and an ether of a glycol mono-aryloxy-acetate. No. 2,142,125. Ernest F. Grether to Dow Chemical Co., both of Midland, Mich.

Production plastics; providing an organic compound having an -SH group attached to each of two different carbon atoms, dissolving compound in an alkaline solution and subjecting same to an oxidizing treatment to convert compound into a polymer, then separating polymer from solution in a form capable of being cured by a heat treatment. No. 2,142,145. Joseph C. Patrick, Morrisville, Pa., to Thiokol Corp., Yardville, N. J.

Resinous composition consisting of the product of reaction of: resinous reaction product of polyhydric alcohol, aromatic polycarboxylic acid and aliphatic dicarboxylic acid; phenol-aldehyde resin; vegetable oil; and natural resin. No. 2,142,833. Kenneth H. Benton and Robert W. Work, Pittsfield, Mass., to General Electric Co., corp. of N. Y.

Method stabilizing articles containing polymerized styrene. No. 2,142,968. Sylvia M. Stoesser to Dow Chemical Co., both of Midland, Mich.

Production urea resin molding composition. No. 2,143,413. Carleton Ellis, Jr., Montclair, N. J., to Plaskon Co., corp. of Del.

Treatment a formed formaldehyde resin to obtain a polished surface thereon; subjecting same to action of an aqueous solution containing a hypochlorite and free alkali. No. 2,143,888. Carl W. Kuehne, Milburn Township, N. J., to Kuehne Chemical Co., corp. of N. J.

Preparation resinous product, by reacting salicylic acid with formalin in presence of an organic acid; dehydrating acid resin so obtained, and reacting with glycerine. No. 2,144,101. William H. Butler, Palisades Park, N. J., to Bakelite Corp., New York City.

Production resin; product of the reaction between concentrated lactyllactic acid, a disaccharide and modifying agents; resin having property of being water-resistant. No. 2,144,352. Paul D. Watson, Alexandria, Va., to free use of people of U. S.

Method making and curing alkyd-resin films, free from wavy and beady characteristics. No. 2,144,548. Moyer M. Safford, Schenectady, N. Y., to General Electric Co., corp. of New York.

Production synthetic resins. No. 2,145,050. Adolf Hodler, Ludwigshafen-am-Rhine, Germany, to I. G., Frankfort-am-Main, Germany.

Phenol-aldehyde rubber hydrochloride compositions; a tough, resilient, non-thermoplastic product. No. 2,145,412. Herbert A. Winkelmann to Marbon Corp., both of Chicago, Ill.

Manufacture water soluble artificial resins for loading textiles. No. 2,145,695. Paolo Mattiotto, Milan, Italy.

Electrolyte for electrolytic condensers; the reaction product of natural resin, a strong base, and water. No. 2,145,710. Frank M. Clark, Pittsfield, Mass., to General Electric Co., corp. of N. Y.

Rubber

Condensing organic sulfur compounds; providing an organic compound having a substituent joined to each of two different carbon atoms, which substituent is split off during the reaction, reacting this with an alkaline polysulfide, oxidizing the product, and obtaining a polymer in intermediate, potentially reactive form, capable of being cured by subsequent heat treatment. No. 2,142,144. Joseph C. Patrick, Morrisville, Pa., to Thiokol Corp., Yardville, N. J.

Production a vulcanized rubber product. No. 2,143,161. Wm. E. Messer, Cheshire, Conn., to U. S. Rubber Co., New York City.

Vulcanizing rubber by heating mixture of rubber and sulfur in presence of diphenylguanidine phthalate and adding a mercaptothiazole accelerator. No. 2,143,455. Robt. L. Sibley, Nitro, W. Va., to Monsanto Chemical Co., St. Louis, Mo.

Rubber composition. No. 2,143,470. Wilhelm Becker, Cologne-Mulheim, and Albert Koch, Cologne-Deutz, Germany, to I. G., Frankfort-am-Main, Germany.

Crude rubber composition made from following: smoked rubber, zinc oxide, carbon black, antimony, sulfur, rosin, pumice (powdered). No. 2,143,897. Alfonso C. Oriola, Bronx, N. Y., one-half to Nicolo Lo Cicero.

Production integral rubber articles having variegated composition and an undulated surface. No. 2,144,388. Kurt H. Quasebarth, Hauppauge, N. Y.

Method preserving rubber. No. 2,144,446. Ira Williams, Woodstown, N. J., and Arthur Morrill Neal, Wilmington, Del., to du Pont, Wilmington, Del.

Composite article, consisting of rubber and another material bonded to each other by an intermediate film comprising a mixture of rubber and a synthetic drying oil. No. 2,144,495. Bingham J. Humphrey to Firestone Tire & Rubber Co., both of Akron, O.

Method preserving rubber. No. 2,144,590. Jan Teppema, Boston, Mass., to Wingfoot Corp., Wilmington, Del.

Process reclaiming and devulcanizing rubber. No. 2,145,341. Chas. H. Campbell, Kent, O.

Vulcanization of rubber. No. 2,145,808. Robert L. Sibley, Nitro, W. Va., to Monsanto Chemical Co., St. Louis, Mo.

Textiles

Production cellulose acetate crepe threads. No. 2,142,118. Henry Dreyfus, London, England.

Production crepe threads; stretching threads containing filaments of organic derivatives of cellulose in presence of a hot aqueous medium, then twisting. No. 2,142,119. Henry Dreyfus, London, and Donald Finlayson and Charles Ernest Stafford, Spondon, near Derby, England, to Celanese Corp. of America, corp. of Del.

Production crepe threads; stretching cellulose derivative threads in presence of an organic softening agent, then twisting. No. 2,142,120. Henry Dreyfus, London, and Robert Wighton Moncrieff, Sidney James Menzer and Thomas Eccles, Spondon, near Derby, England, to Celanese Corp. of America, corp. of Del.

Manufacture artificial filaments, ribbons, films, etc. No. 2,142,121. Henry Dreyfus, London, England.

Manufacture crepe threads having a basis of organic esters of cellulose. No. 2,142,122. Henry Dreyfus, London, England.

Production crepe fabric from thread containing filaments of cellulose acetate or other organic ester of cellulose. No. 2,142,715. William Alexander Dickie, Spondon, near Derby, England, to Celanese Corp. of America, corp. of Del.

Yarn conditioning process and composition therefor. No. 2,143,765. Jos. B. Dickey and James G. McNally to Eastman Kodak Co., all of Rochester, N. Y.

Method forming spun yarns containing short lengths of artificial fibres. No. 2,144,354. William Whitehead, Cumberland, Md., to Celanese Corp. of America, corp. of Del.

Manufacture crepe fabric containing organic derivatives of cellulose. No. 2,144,676. Camille Dreyfus, New York City, and Wm. Whitehead and Herbert Platt, Cumberland, Md., to Celanese Corp. of America, corp. of Del.

Production crepe fabrics, using creping liquid to obtain crepe effect. No. 2,144,677. Henry Dreyfus, London, and Wm. Alexander Dickie, Spondon, near Derby, England, to Celanese Corp. of America, corp. of Del.

Production fabrics exhibiting crepe effects. No. 2,144,685. Albert Mellor and Ralph James Mann, Spondon, near Derby, England, to Celanese Corp. of America, corp. of Del.

Process reducing felting properties of wool or other fibrous substances of animal origin. No. 2,144,824. Georg Wiegand to Chemische Fabrik Grunau, Londshoff & Meyer, A. G., all of Berlin-Grunau, Germany.

Process matting textiles, using water-insoluble condensation product of urea and formaldehyde. No. 2,145,011. Albert Landolt, Riehen, and Gustave Widmer and Hans Benz, Basel, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Bleaching cellulosic materials; subjecting material to treatment with an acid aqueous solution containing a metal chlorite. No. 2,145,062. Maurice C. Taylor and James F. White, Niagara Falls, N. Y., to Mathieson Alkali Works, New York City.

Production artificial thread having high tensile strength and possessing axially regular crystalline structure visible under X-rays. No. 2,145,076. Paul Ehrenstein, Lyon, France, to Societe "Rhodiaceta," corp. of France.

Production improved textile fabrics; treating same with an aqueous solution of an alkali salt of thiocyanic acid having a density of 6 to 10° Bé. No. 2,145,297. Camille Dreyfus, New York City.

Treatment coated fabrics; for shrinking. No. 2,145,385. Cornelius Anthony Alt, Newburgh, N. Y., to du Pont, Wilmington, Del.

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